

# Borehole Data Package for Calendar Year 2001 RCRA Wells at Single-Shell Tank Waste Management Area B-BX-BY

D. G. Horton

March 2002



Prepared for the U.S. Department of Energy under Contract DE-AC06-76RL01830

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> PACIFIC NORTHWEST NATIONAL LABORATORY operated by BATTELLE for the UNITED STATES DEPARTMENT OF ENERGY under Contract DE-AC06-76RL01830



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Pacific Northwest National Laboratory Richland, Washington 99352

## **Summary**

This document is a compilation of the information on well drilling and construction, well development, pump installation, and sediment sampling at three new RCRA wells (299-E33-337, 299-E33-338, and 299-E33-339) constructed at Waste Management Area B-BX-BY in July and August 2001. These wells were constructed to the specifications and requirements described in Washington Administrative Codes 173-160 and 173-303.

Grab samples for geological description and archive were collected every 5 ft throughout the wells. In addition, samples were collected at 5-ft intervals from 40 to 120 ft below ground surface to support the Groundwater/Vadose Zone Integration Project. The boreholes were geophysically logged with spectral gamma-ray and neutron moisture tools. Cesium-137 was the only manmade radionuclide detected in these wells.

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#### 1.0 Introduction

Three new *Resource Conservation and Recovery Act* (RCRA) groundwater monitoring wells were installed at the single-shell tank farm Waste Management Area (WMA) B-BX-BY in July and August 2001 in partial fulfillment of Tri-Party Agreement (Ecology et al. 1998) milestone M-24-00M. The well names are 299-E33-337, 299-E33-338, and 299-E33-339. Table 1 correlates the well names with the well numbers. Well 299-E33-337 is located south of the 241-B tank farm, well 299-E33-338 is located at the southeast corner of the 241-B tank farm, and well 299-E33-339 is located at the southeast corner of the 241-BX tank farm. All three wells are new downgradient wells in the groundwater monitoring network. The locations of all wells in the WMA B-BX-BY monitoring network are shown on Figure 1.

The original assessment monitoring plan for WMA B-BX-BY was issued in 1996 (Caggiano 1996). That plan was updated for the continued assessment at WMA B-BX-BY in 2000 (Narbutovskih 2000). The updated plan provides justification for new wells at the WMA. The new wells were constructed to the specifications and requirements described in Washington Administrative Codes 173-160 and 173-303, the updated assessment plan for WMA B-BX-BY (Narbutovskih 2000), and the description of work for well drilling and construction.<sup>1</sup>

This document compiles information on the drilling and construction, well development, pump installation, sediment sampling, and geophysical logging applicable to the installation of the three new wells. Appendix A contains the Well Summary Sheets (as-built diagrams), the Well Construction Summary Reports, the geologist's logs, and well location surveys; Appendix B contains results of physical properties testing; and Appendix C contains borehole geophysical logs. Additional documentation concerning well construction is on file with Bechtel Hanford, Inc., Richland, Washington.

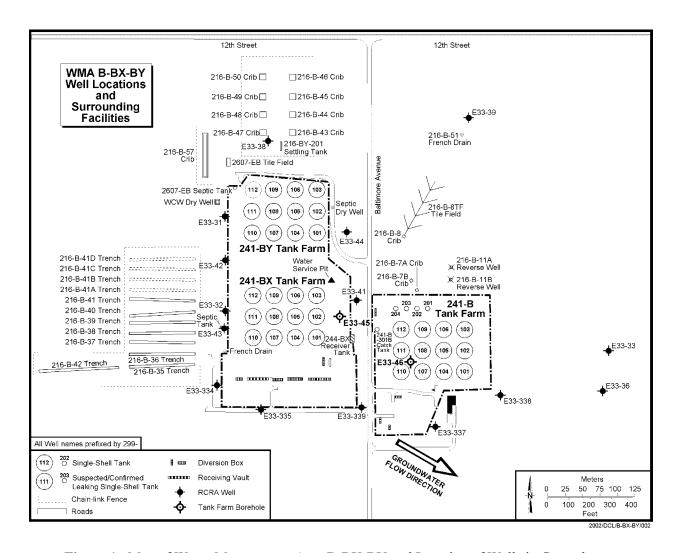
English units are used in this report because that is the system of units used by drillers to measure and report depths and well construction details. The information below can be used for conversion to metric units:

- 1 foot (ft) = 0.3048 meter
- 1 inch (in.) = 2.54 centimeters
- 1 gallon (gal) = 3.785 liters

Table 1. Well Names and Well Numbers for Wells Drilled During Calendar Year 2001

Well Name	Well Number
299-E33-337	C3390
299-E33-338	C3391
299-E33-339	C3392

<sup>&</sup>lt;sup>1</sup> Letter from J. S. Fruchter (Pacific Northwest National Laboratory) to G. B. Mitchem (Bechtel Hanford Inc.) *Description of Work for Drilling FY 2001 RCRA Groundwater Monitoring Wells*, dated April 16, 2001.



**Figure 1**. Map of Waste Management Area B-BX-BY and Location of Wells in Groundwater Monitoring Network

#### 2.0 Well 299-E33-337

#### 2.1 Drilling and Sampling

Well 299-E33-337 was drilled in July 2001 with an air rotary drill rig from the surface to a total depth of 286 ft below ground surface (bgs). Temporary 10-¾-in.-outside-diameter, carbon steel casing was used for the entire depth. An undocumented quantity of water was added to the borehole at 255 ft bgs to facilitate drilling.

The sediments encountered during drilling were predominantly sand, sandy gravel, and gravelly sand of the Hanford formation upper gravel sequence (H1 unit) from the surface to about 60 ft bgs; sand and silty sand of the Hanford formation sand sequence (H2 unit) from about 60 to 215 ft bgs; and undifferentiated Hanford formation lower gravel sequence/Plio-Pleistocene gravelly sand and sandy gravel from 215 to 281 ft bgs. Basalt was encountered at 281 ft bgs. The geologist's log is included in Appendix A.

Grab samples for geologic description and archive were collected every 5 ft throughout the borehole. In addition, 1-gal samples were collected at 5-ft intervals from 40 to 120 ft bgs to support the Groundwater/Vadose Zone Integration Project's Science and Technology purposes. Also, one split spoon sample was taken from 259.9 to 261.9 ft bgs for analysis of particle size distribution. Particle size distribution data are in Appendix B.

The borehole and drill cuttings were monitored regularly for organic vapors and radionuclide contaminants. No contamination was found by field screening methods. The borehole was geophysically logged with spectral gamma-ray and neutron moisture tools between July 18 and July 24, 2001. Cesium-137 was the only manmade radionuclide that was detected and occurred from 1 to 2 ft bgs at a concentration of about 0.4 pCi/g. The geophysical logs are in Appendix C.

## 2.2 Well Completion

The permanent casing and screen were installed in well 299-E33-337 in July and August 2001. A 4-in.-inner-diameter, stainless steel, wire wrap, 20 slot screen was set from 255.36 to 280.39 ft bgs. The permanent casing is 4-in.-inner-diameter, stainless steel from 255.36 ft bgs to 2.1 ft above ground surface. A 2-ft-long stainless steel sump with end cap is below the screen from a depth of 280.39 to 282.4 ft.

A bentonite seal was placed in the bottom 2 ft of the borehole from 286.0 to 283.6 ft bgs. The filter pack is 10 to 20 mesh silica sand from 245.1 to 283.6 ft bgs. The annular seal is bentonite pellets from 245.1 to 239.6 ft bgs, bentonite crumbles from 239.6 to 10.1 ft bgs, and Portland cement grout from 10.1 ft bgs to the surface. A 4 ft by 4 ft by 6 in. concrete pad was placed around the well at the surface. A protective casing with locking cap, four protective steel posts, and a brass marker stamped with the well number were set into the concrete. The protective casing extends 2.71 ft above the concrete pad. The Well Summary Sheet (as-built) and Well Construction Summary Report are included in Appendix A.

The vertical and horizontal coordinates of the well were surveyed in December 2001. The horizontal position of the well was determined by Global Positioning System observations referenced to horizontal control stations established by Rogers Surveying, Inc., Richland, Washington and the U.S. Army Corps of Engineers. The coordinates are Washington State Plane Coordinates, South Zone, NAD83(91) datum. Vertical datum is NAVD 1988 and is based on existing benchmarks established by the U.S. Army Corps of Engineers. Survey data are included in Table 2.

Table 2. Survey Data for New Wells at Waste Management Area B-BX-BY

Well Name	Easting (m)	Northing (m)	Elevation (m)	Reference Point
	573821.80	137193.87		Center of casing
299-E33-337			202.716	"X" on rim
	573821.82	137194.18	201.990	Brass cap
	573912.07	137238.24		Center of casing
299-E33-338			201.107	"X" on rim
	573912.11	137238.58	200.260	Brass cap
	573716.86	137221.51		Center of casing
299-E33-339		_	203.027	"X" on rim
	573716.84	137221.84	202.303	Brass cap

#### 2.3 Well Development and Pump Installation

Well 299-E33-337 was developed on August 22, 2001. A temporary, 1 hp, submersible pump was used to remove approximately 3,140 gal of formation water. First, about 2,660 gal of water were removed from the well at 20 gal/min with a maximum drawdown of about 0.061 ft. The pump intake was at 280.5 ft bgs (20.3 ft below the water table). Second, the pump intake was raised to 269.5 ft bgs (9.3 ft below the water table) and about 480 gal of water were removed at 20 gal/min. The resulting maximum drawdown was 0.017 ft. The final turbidity for both depths was less than 0.5 NTU.

A dedicated Grundfos Redi-Flo2, submersible sampling pump was installed in well 299-E33-337 on August 30, 2001. The sampling pump intake is at 270.35 ft below top of casing (or about 7.1 ft below the water table). The static water level was 263.25 ft below the top of casing (the casing extends 2.71 ft above the concrete pad) on August 30, 2001.

#### 3.0 Well 299-E33-338

#### 3.1 Drilling and Sampling

Well 299-E33-338 was drilled in July and August 2001 with a cable tool drill rig using a drive barrel with split spoon assemblies from the surface to the top of basalt at 271 ft bgs. A hard tool was used from 271 ft to a total depth of 275.6 ft bgs. Temporary 13-in.-outside-diameter, carbon steel casing was used from the surface to 50 ft and 9-in.-outside-diameter, carbon steel casing from the surface to total depth. An undocumented amount of water was added to the borehole at about 271 ft bgs to facilitate removal of sand from the bore.

The sediments encountered during drilling were dominantly silty sandy gravel and silty gravelly sand of the Hanford formation (H1 unit) from the surface to about 31 ft bgs; the Hanford formation H2 unit sand, and silty sand with minor gravel component from about 31 to about 218 ft bgs; a Plio-Pleistocene silt to sandy silt from 218 to 223 ft bgs; and undifferentiated Hanford formation lower gravel sequence/ Plio-Pleistocene silty sandy gravel and sandy gravel from 218 to 271 ft bgs. The top of basalt was encountered at 271 ft bgs. The geologist's log is included in Appendix A.

Borehole 299-E33-338 was continuously sampled by split spoon from the surface to 258 ft bgs. The samples were collected in 2-ft-long, 4-in.-diameter lexan liners and were sent to the laboratory for determination of various physical and chemical properties. The results of those tests will be published elsewhere. In addition, samples for moisture determination were collected from intervals corresponding to each splitspoon sample and grab samples for geologic description and archive were collected every 5 ft throughout the borehole. Also, one split spoon sample was taken from 259.4 to 261.4 ft bgs for analysis of particle size distribution. The particle size distribution data are in Appendix B.

The borehole and drill cuttings were monitored regularly for organic vapors and radionuclide contaminants. No contamination was found by field screening methods. The borehole was geophysically logged with spectral gamma-ray and neutron moisture tools on August 13 and August 14, 2001. Cesium-137 was identified near the ground surface at less than 1 pCi/g. No other manmade contamination was identified.

## 3.2 Well Completion

The permanent casing and screen were installed in well 299-E33-338 in August 2001. A 4-in.-inner-diameter, stainless steel, wire wrap, 20 slot screen was set from 270.9 to 250.9 ft bgs. An end cap was placed on the bottom of the screen from 271.32 to 270.9 ft bgs. The permanent casing is 4-in.-inner-diameter, stainless steel from 250.9 ft bgs to 2.0 ft above ground surface.

A bentonite plug was placed in the bottom of the borehole from 275.6 to 271.5 ft bgs. The filter pack is 10 to 20 mesh silica sand from 271.5 to 241.0 ft bgs. The annular seal is bentonite pellets from 241.0 to 236.0 ft bgs, bentonite crumbles from 236.0 to 10.6 ft bgs, and Portland cement grout from 10.6 ft bgs

to the surface. A 4 ft by 4 ft by 6 in. concrete pad was placed around the well at the surface. A 6-in. stainless steel protective casing with locking cap, four protective steel posts, and a brass marker stamped with the well number were set into the concrete. The protective casing extends 2.78 ft above the concrete pad. The Well Summary Sheet (as-built) and Well Construction Summary Report are included in Appendix A.

The vertical and horizontal coordinates of the well were surveyed in December 2001. The horizontal position of the well was determined by Global Positioning System observations referenced to horizontal control stations established by Rogers Surveying, Inc., Richland, Washington and the U.S. Army Corps of Engineers. The coordinates are Washington Coordinate System, South Zone, NAD83(91) datum. Vertical datum is NAVD 1988 and is based on existing benchmarks established by the U.S. Army Corps of Engineers. Survey data are included in Table 2.

## 3.3 Well Development and Pump Installation

Well 299-E33-338 was developed on September 4, 2001. A temporary, 1 hp, submersible pump was used to remove approximately 2,380 gal of formation water at 20 gal/min. The pump intake was at 267.5 ft below top of casing (the protective casing extends 2.78 ft above the concrete pad) and drawdown was 0.022 ft. The final turbidity was 0.17 NTU.

A dedicated, Redi Flo-2 submersible sampling pump was installed in well 299-E33-338 on September 5, 2001. The sampling pump intake is at 265.35 ft below top of casings (or about 12.75 ft below the water table). The static water level was 258.1 ft below top of casing on September 5, 2001.

### 4.0 Well 299-E33-339

## 4.1 Drilling and Sampling

In July 2001, well 299-E33-339 was drilled with a cable tool drill rig from the surface to a depth of 50 ft and air rotary from 50 ft to the total depth of 285.44 ft bgs. Temporary 10-3/4-outside-diameter, carbon steel casing was placed from the surface to 280.1 ft bgs during drilling. An undocumented amount of water was added to the borehole at a depth of 61 ft for dust suppression and at about 245 ft to facilitate drilling.

Preliminary evaluation shows that the sediments encountered during drilling were backfill to 6 ft bgs; Hanford formation sandy gravel and silty sandy gravel with lesser amounts of sand and silty sand (H1 unit) from 6 to 56 ft bgs; Hanford formation sand (H2 unit) from 56 to 223 ft bgs; and undifferentiated Hanford formation/Plio-Pleistocene gravel, sandy gravel, and slightly silty sandy gravel from 223 to 279 ft bgs. The top of basalt was encountered at 279 ft bgs. The geologist's log is in Appendix A.

Sediment samples were collected at approximately 5-ft intervals for geologic description and archive throughout the entire borehole. One split spoon sample was collected from 260.0 to 262.0 ft bgs for analysis of grain size distribution. Data are in Appendix B.

The borehole and drill cuttings were monitored regularly for organic vapors and radionuclide contaminants. No contamination was noted by field screening methods. The borehole was geophysically logged with spectral gamma-ray and neutron moisture tools between July 26 and August 1, 2001. Cesium-137 was identified at the ground surface at about 0.7 pCi/g. No other man-made radioisotopes were found. The geophysical logs are in Appendix C.

#### 4.2 Well Completion

The permanent casing and screen were installed in well 299-E33-339 in August 2001. A 4-in.-inner-diameter, stainless steel, wire wrap, 20 slot screen was set from 279.3 to 259.4 ft bgs. An end cap was placed on the bottom of the screen from 281.4 to 279.3 ft bgs. The permanent casing is 4-in.-inner-diameter, stainless steel from 259.4 ft bgs to 2.0 ft above ground surface.

A bentonite plug was placed in the bottom of the borehole from 285.44 to 283.1 ft bgs. The filter pack is 10 to 20 mesh silica sand from 283.1 to 249.7 ft bgs. The annular seal is bentonite pellets from 249.7 to 244.4 ft bgs, bentonite crumbles from 244.4 to 10.4 ft bgs, and Portland cement from 10.4 ft bgs to the surface. A 4 ft by 4 ft by 6 in. concrete pad was placed around the well at the surface. A 6-in. stainless steel protective casing with locking cap, four protective steel posts, and a brass marker stamped with the well number were set into the concrete. The protective casing extends 2.38 ft above the concrete pad. The Well Summary Sheet (as-built) and Well Construction Summary Report are included in Appendix A.

The vertical and horizontal coordinates of the well were surveyed in December 2001. The horizontal position of the well was determined by Global Positioning System observations referenced to horizontal control stations established by Rogers Surveying, Inc., Richland, Washington and the U.S. Army Corps of Engineers. The coordinates are Washington Coordinate System, South Zone, NAD83(91) datum. Vertical datum is NAVD 1988 and is based on existing benchmarks established by the U.S. Army Corps of Engineers. Survey data are included in Table 2.

## 4.3 Well Development and Pump Installation

Well 299-E33-339 was developed on August 21, 2001. A temporary, 1 hp submersible pump was used to remove approximately about 2,400 gal of formation water at 20 gal/min. The pump intake was at 277 ft bgs and drawdown was 0.027 ft. The final turbidity was 0.17 NTU. The static water level was 261.27 ft bgs on August 21, 2001.

A dedicated, Redi Flo-2 submersible sampling pump was installed in well 299-E33-339 on August 30, 2001. The sampling pump intake is at 270.35 ft below top of casing (or 6.15 ft below the water table).

### 5.0 References

Caggiano, J. A. 1996. Assessment Groundwater Monitoring Plan for Single-Shell Tank Waste Management Area B-BX-BY. WHC-SD-ENV-AP-002, Westinghouse Hanford Company, Richland, Washington.

Ecology - Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy. 1998. *Hanford Federal Facility Agreement and Consent Order*. Document No. 89-10, Rev. 5 (The Tri-Party Agreement), Ecology, Olympia, Washington.

Narbutovskih, S. M. 2000. *Groundwater Quality Assessment Plan for Single-Shell Waste Management Area B-BX-BY at the Hanford Site*. PNNL-13022, Pacific Northwest National Laboratory, Richland, Washington.

NAVD88. 1988. North American Vertical Datum of 1988.

RCRA - *Resource Conservation and Recovery Act.* 1976. Public Law 94-580, as amended, 90 Stat. 2795, 42 USC 6901 et seq.

WAC 173-160, Washington Administrative Code. *Minimum Standards for Construction and Maintenance of Wells*. Olympia, Washington.

WAC 173-303, Washington Administrative Code. *Dangerous Waste Regulations*. Olympia, Washington.

# Appendix A

**Well Construction and Completion Documentation** 

					Start Date: 07 110	lat	
WELL CONS	STRUCTION	A SI IN	ΛΝΔΕ	RY REPORT	Finish Date: 08 \03101		
WELL OOM		1 001	ATTAIN.ZT	VI INLI OIVI	-		
Specification No.: V 0004	Day No.		· I.	141.11.11.	Page 1		
4 /	Rev. No.:	<u> </u>		Well Name: 249-633-337	Temp_Well No.: C		
ECNs: P/A				Approximate Location: South of	= 241-B Tank Fo	(rm	
Project: CYDI RCRA DO				Other Companies: CHI			
Drilling Company: Resonanร	Sonic Inc (	<u> </u>		Geologist(s): c. martinez,	C. Trice, U.	Hocking	
Driller: mike Gomez	A. A					- CONTRACTOR	
TEMPORARY CAS	ING AND DRILL DE	ртн 🧀	TAME	DRILLING METH	IOD/HOLE DIAMETI	R.	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O		Auger:	Diameter From	to	
Corbon Steel (PS) 10% 10	0' - 281	103/4"	/104	Cable Tool:	Diameter From	to	
•				Air Rotary: 910 10 3/4 "	Diameter Fromc	to ;	780
				A.R. w/Sonic:	Diameter From	to	
	•				Diameter From	to	
	-				Diameter From	to	
*Indicate Welded (W) - Flush Jo	int (FJ) Coupled (C)	& Thread	Design		Diameter From	to	
		-		Delling Fluid:	<del></del> ,	······································	
Total Drilled Depth: コミック	Hole Dia @ TD: \	3, Y		Drilling Fluid: Air	a Dalling: AIA		
				Total Amt. Of Water Added Durin	T	<del></del>	
Well Straightness Test Results: و ارداره والمحادثة المحادثة المحا	lone using a 20	.4 long	45,9ID	Static Water Level: 259.92	Date:08  03  01	Files Vol. 199	gas file ye
with Water addings along which and ten he the thin around a non-class market in	والمتعارض والمناهد ويعام والمالية المالية المالية المالية المالية	I		AL LOGGING			
Sondes (type)	Interval	Da	ate	Sondes (type)	Interval	Date	<u>e</u>
Spectral Gamma	10 - 283'	7/18/	61			ļ	
Spectral Gamma Neutron moisture	<u>/6' - 283'</u> _/ - 260,25	7/18/	101 1/01	· ·			
Neutron moisture	1 - 260.25	7/24			-		
Neutron moisture		7/24	4/01	ED WELL			
Neutron moisture	1 - 260.25	7/24	4/01	Туре	interval Annual Seal/Filter Pack	Volume	Mesh Size
Neutron moisture	1 - 260,25	7/24	COMPLET	Туре		2 bucks	Mest
Neutron moisture  Size/Wt./Material  4"ID 55 304 L Sump		7/24 	COMPLET Slot Size	Type  (Pellets)  (Pentoni te Holo ping (50°)	Annual Seal/Filter Paci	16	Mesi Size
Neutron moisture  SizeWt/Material  4"ID 55 304 L Sump  4"TO 55 304 L Screen		7/24  ### ( Thread	Slot Size	Type  Bentonite Holephy (502)  Colorado Silica Sand(50	Annual Seal/Filter Paci	1 2 buckil 46 ikozil 43 hags	Mesi Size
Neutron moisture  Size/Wt./Material  4"ID 55 304 L Sump	Depth 286.39' - 282.4' 255.36' - 282.39	7/24 Thread P480	COMPLET Slot Size	Type  Bentonite Hole plug (50°)  Colorado Silica Sand(50°)  Bentonite Rellets (50°)	Annual Seal/Filter Paci 283.64 - 286.06 246.14 - 283.64 289.64 - 245.17	2 bucket 46 ACW 43 hags	Mest Size
Neutron moisture  SizeWt/Material  4"ID 55 304 L Sump  4"TO 55 304 L Screen	Depth 286.39' - 282.4' 255.36' - 282.39	7/24 Thread P480	Slot Size	Type  Bentonite Hole plug (50°)  Colorado Silica Sandíso  Bentonite Rellets (50°)  Bentonite Crumbles (50°)	Annual Seal/Filter Pack  283.6 - 286.0  383.6 - 283.6  289.6 - 245.1  10.1 - 239.6	La bucket 46 Aray 43 hags 43 buckets 170 bogs	Mest Size
Neutron moisture  SizeWt/Material  4"ID 55 304 L Sump  4"TO 55 304 L Screen	Depth 286.39' - 282.4' 255.36' - 282.39	7/24 Thread P 480	COMPLET Slot Size OLA O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.	Type  Bentonite Hole plug (50°)  Colorado Silica Sand(50°)  Bentonite Rellets (50°)	Annual Seal/Filter Pack  283.6 - 286.6  383.6 - 283.6  289.6 - 245.1  10.1 - 239.6  0 - 10.1	La bucket 46 Man 43 hages 45 buckets 170 bags	Mest Size
Size/Wt./Material  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Casing	Depth  280.39' - 282.4'  255.34' - 285.34'  +2.1' - 255.34'	7/24 Thread P 450	COMPLET Stot Size  OLA O.O.O.O.O  OTHER A	Type  Bentonite Holephy (50°)  Colorado Silica Sand(50°)  Bentonite Rellets (50°)  Bentonite Crumbles (50°)  Portland Cement (94°  CTIVITIES	Annual Seal/Filter Pack  283.6 - 286.0  383.6 - 283.6  289.6 - 245.1  10.1 - 239.6	La bucket 46 Aray 43 hags 43 buckets 170 bogs	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Casing  Aquifer Test: UE// Devel	Depth 280.39' - 282.4' 255.36' - 282.39' +2.1' - 255.36'	7/24 Thread P 450 V	COMPLET Stot Size	Type  Bentonite Hole plug (50°)  Colorado Silica Sand(50°)  Bentonite Pallets (50°)  Bentonite Crumbles (50°)  Portland Cement (94°)  CTIVITIES  Well Abandoned:	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Casing  Aquifer Test: Well Devel Description: Pumped us	Depth 280.39' - 282.4' 255.36' - 282.39' +2.1' - 255.36'	7/24 Thread P 450 V	COMPLET Stot Size	Type  Bentonite Holephy (50°)  Colorado Silica Sand(50°)  Bentonite Rellets (50°)  Bentonite Crumbles (50°)  Portland Cement (94°  CTIVITIES	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Screen  4"ID 55 304 L Casing  Aquifer Test: Uell Devel Description: Pumped us  4" 20 9pm for 9 7	Depth  280.39' - 282.4'  255.34' - 285.34'  42.1' - 255.34'  opment  ing submersis	Thread PHBD U Date: 8,66e pur	COMPLET Slot Size O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.O.	Type  Bentonite Hole plug (50°)  Colorado Silica Sand(50°)  Bentonite Pellets (50°)  Bentonite Crembles (50°)  Portland Cement (90°)  Well Abandoned:  Description:	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Screen  4"ID 55 304 L Casing  Aquifer Test: Uell Devel Description: Pumped us  4" 20 9pm for 9 7	Depth  280.39' - 282.4'  255.34' - 280.39'  +2.1' - 255.34'	Thread Fuso V Date: 8/ ble.pur minv reen). D	COMPLET Slot Size  OLA  OLA  OLA  OTHER A  DESCRIPTION  OF SIZE  OLA  OLA  OLA  OLA  OLA  OLA  OLA  OL	Type  Bentonite Hole plug (50°)  Colorado Silica Sandíso  Bentonite Rellets (50°)  Bentonite Crumbles (50°)  Portland Cement (90°  CTIVITIES  Well Abandoned:  Description:	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Sump  4"ID 55 304 L Sureen  4"ID 55 304 L Casing  Aquifer Test: Ue// Devel  Description: Pumped us  4 20 9pm for 9 7  developed upper + lower	Depth  280.39' - 282.4'  255.34' - 285.34'  42.1' - 255.34'  opment  ing submersis	Thread Fuso V Date: 8/ ble.pur minv reen). D	COMPLET Slot Size  OLA  OLA  OLA  OTHER A  DESCRIPTION  OF SIZE  OLA  OLA  OLA  OLA  OLA  OLA  OLA  OL	Type  Rentonite Hale plug (50°)  Colorado Silica Sand(50°)  Rentonite Rellets (50°)  Bentonite Crumbles (50°)  Portland Cement (94°  CTIVITIES  Well Abandoned:  Description:	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Casing  Aquifer Test: Ub/I Devel  Description: Pumped us  4 20 9pm for 9 7  Cheelined upper + lower  Date:	Depth  280.39' - 282.4'  255.34' - 285.34'  255.34' - 275.34'  ball' - 275.34'  copment  ing submersion  total of 157  er parts of sca	Thread Fuso V Date: 8/ ble.pur minv reen). D	COMPLET Slot Size  OLA  OLA  OLA  OTHER A  DESCRIPTION  OF SIZE  OLA  OLA  OLA  OLA  OLA  OLA  OLA  OL	Type  Rentonite Hale plug (50°)  Colorado Silica Sand(50°)  Rentonite Rellets (50°)  Bentonite Crumbles (50°)  Portland Cement (94°)  CTIVITIES  Well Abandoned:  Description:  VEY DATA  Protective Casing Elevation:	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt./Material  4"ID 55 304 L Sump  6"ID 55	Depth  280.39' - 282.4'  255.34' - 282.39'  +2.1' - 255.34'  Copment  ing submersion  of g of 157  or parts of sca	Date: 8/ble.pur	COMPLET Siot Size  OLA OLOR OTHER AN POPULATION (es D ~ 0.00 VELL SUF	Type  Bentonite Hole plug (50°)  Colorado Silica Sand(50°)  Bentonite Rellets (50°)  Bentonite Crembles (50°)  Portland Cement (90°)  Well Abandoned:  Description:  FY:  WEY DATA  Protective Casing Elevation:  Brass Cap Elevation:	Annual Seal/Filter Pack  283.4 286.0  239.6 283.6  239.6 245.1  10.1 - 239.6  0 - 10.1	Jabuckt Je prokat Je prokat Je prokate Je prokate	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Sump  4"ID 55 304 L Screen  4"ID 55 304 L Casing  Aquifer Test: Ub/I Devel  Description: Pumped us  4 20 9pm for 9 7  Cheelined upper + lower  Date:	Depth  280.39' - 282.4'  255.34' - 282.39'  +2.1' - 255.34'  Copment  ing submersion  of g of 157  or parts of sca	Date: 8, ble. pur minv:	COMPLET Siot Size  OLA OLOR OTHER AN POST	Type  Rentonite Hale plug (50°)  Colorado Silica Sand(50°)  Rentonite Rellets (50°)  Bentonite Crumbles (50°)  Portland Cement (94°)  CTIVITIES  Well Abandoned:  Description:  VEY DATA  Protective Casing Elevation:	Annual Seal/Filter Pack  283.4 - 286.0 - 283.6	2 bucket 1/6 Arch 1/5 Arch 1/5 buckets 1/70 bogs 5 bags	Mest Size Size
Size/Wt./Material  4"ID 55 304 L Sump  4"ID 55 304 L Casing  Aquifer Test: Uk   Devel  Description: Pumped us  4 20 9pm for 9 7  Gevelued upper + 10 we  Date:  Washington State Plane Coordin	Depth  280.39' - 282.4'  255.34' - 282.39'  +2.1' - 255.34'  Copment  ing submersion  of g of 157  or parts of sca	Thread FHED V Date: 8/ ble.pur minu reen). D	COMPLET Siot Size  OLA OLOR OTHER AN POPULATION (es D ~ 0.00 VELL SUF	Type  Rentonite Hole plug (50°)  Colorado Silica Sandiso  Rentonite Rellets (50°)  Rentonite Crambles (50°)  Rentonite Crambles (50°)  Rortland Cement (94°)  CTIVITIES  Well Abandoned:  Description:  Protective Casing Elevation:  Brass Cap Elevation:  SIREMARKS	Annual Seal/Filter Pack  283.4 286.0  245.1 - 283.4  245.1 - 283.4  245.1 - 245.1  10.1 - 233.4  0 - 10.1	2 bucket 1/6 Arch 1/5 Arch 1/5 buckets 1/70 bogs 5 bags	Mest Size Size
SizeWt/Material  4"ID SS 304L Sump  4"ID SS 304L Sump  4"ID SS 304L Sump  4"ID SS 304L Casing  Aquifer Test: Uk// Devel Description: Pumped us  4" 20 9pm for 9 11  Geveloped upper + 10 we  Date: Washington State Plane Coordin  1001 Salves: bention in paller  1004 1006	Depth  280.39' - 282.39'  255.36' - 285.36'  255.36' - 255.36'  255.36	Date: 8/ble.pur	COMPLET Slot Size  OLA OLA OLA OLA OLA OLA OLA OLA OLA OL	Type  Rentonite Hole plug (50°)  Colorado Silica Sand(50°)  Rentonite Rellets (50°)  Rentonite Crambles (50°)  Rentonite Rellets  Well Abandoned:  Description:  Protective Casing Elevation:  Brass Cap Elevation:  SREMARKS  SREMARKS	Annual Seal/Filter Pack  283.4 - 286.0 - 286.0 - 286.1 - 283.4 - 285.1	2 bucket 1/6 Arch 1/5 Arch 1/5 buckets 1/70 bogs 5 bags	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  50 10 10 10 10 10 10 10 10 10 10 10 10 10	Depth  280.39' - 282.4'  255.36' - 282.39'  +2.1' - 255.36'  be part in submersion of 157  er parts of scales:  15; 0.5 buckets to the submersion of 157  15; 4.5 buckets to the submersion of 157  15	Date: 8/ble.pur	COMPLET Slot Size  OLA  O.OLO  OTHER A  DOTHER A  DOTHER A  COMMENT:	Type  Rentonite Hale plug (50°)  Colorado Silica Sand(50°)  Rentonite Rellets (50°)  Rentonite Crumbles (50°)  Rentonite Crumbles (50°)  Rentonite Crumbles (50°)  Rortland Cement (94°  CTIVITIES  Well Abandoned:  Description:  Protective Casing Elevation:  Brass Cap Elevation:  S/REMARKS	Annual Seal/Filter Pack  283.4 - 286.0  ) 245.1 - 283.6  289.6 - 245.1  ) 10.1 - 239.6  ) 0 - 10.1  Yes: No:  No:	Date:	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  4"ID 55 304 L Casing  Aquifer Test: Well Devel  Description: Pumped us  4 20 9pm for 9 1  Geveloped upper + lowe  Date:  Washington State Plane Coordin  Washington State Plane Coordin  2446  Reported By: Charlens Im	Depth  280.39' - 282.4'  255.36' - 282.39'  +2.1' - 255.36'  be part in submersion of 157  er parts of scales:  15; 0.5 buckets to the submersion of 157  15; 4.5 buckets to the submersion of 157  15	Date: 8/ble. pur	COMPLET Siot Size  OLA OLONG OTHER AN O	Type  Bentonite Hole plug (50°)  Colorado Silica Sand(50°)  Bentonite Rollets (50°)  Bentonite Crambles (50°)  Portland Cement (90°)  Well Abandoned:  Description:  Protective Casing Elevation:  Brass Cap Elevation:  SKREMARKS  = 0.31 ft° solerado silica (90°)  Reviewed By: DC Wee	Annual Seal/Filter Pack  283.4 - 286.0 - 286.0 - 286.1 - 283.4 - 285.1	Date:	Mest Size
Size/Wt/Material  4"ID 55 304 L Sump  50 10 10 10 10 10 10 10 10 10 10 10 10 10	Depth  280.39' - 282.4'  255.36' - 282.39'  +2.1' - 255.36'  be part in submersion of 157  er parts of scales:  15; 0.5 buckets to the submersion of 157  15; 4.5 buckets to the submersion of 157  15	Date: 8/ble.pur	COMPLET Siot Size  OLA OLONG OTHER AN O	Type  Rentonite Hale plug (50°)  Colorado Silica Sand(50°)  Rentonite Rellets (50°)  Rentonite Crumbles (50°)  Rentonite Crumbles (50°)  Rentonite Crumbles (50°)  Rortland Cement (94°  CTIVITIES  Well Abandoned:  Description:  Protective Casing Elevation:  Brass Cap Elevation:  S/REMARKS	Annual Seal/Filter Pack  283.4 - 286.0  ) 245.1 - 283.6  289.6 - 245.1  ) 10.1 - 239.6  ) 0 - 10.1  Yes: No:  No:	Date:	Mesh Size

WELL SUMMARY SHEET Page 1 of 2 Date: 07   16   01								
Well ID: czzao		Well Name	: 299-E.	33-337	2010: 07116[0]			
Location: South of 241-B Tank	Farm	Project: c		RA Drilling	<u> </u>			
Prepared By: Cmartinez	Dateonlielei	Reviewed		Weekes	Date: 8/13/01			
Signature: coarlere marting	58103101	Signature:	2225	ke kes	9,19,51			
CONSTRUCTION DATA	A		G	EOLOGIC/HYDROL	OGIC DATA			
Description	Diagram	Depth in Feet	Graphic Log	Lithologic	Description			
6-dia protective casing set	<b>88</b>	0 -	0000	5-18' Sandy G	. •			
4" ID 35 3044 Casing: +2.1' -> 255.36'				8'-35' 5and (				
Portland Coment grout:		40 —		37-46 Sand (	5)			
Bentonite Crumbles:		-		00'-125' Sand	( <u>s</u> )			
4+3/2 Bentonite Pellets:		· _						
239.6-> 245.1		80	-	•				
4 70 55 3046 0.0204n. SIOT		-	-					
cont. wire-wrop well screen!		-	-					
265.36 > 280.39	1683 111 688	-						
10-20 mesh silica sand 2451' > 283.10'		- - ميا -		125 - 138 5:11	Sand (ms)			
4 ID SS 304L Tailpipe:		_		138 - 178 5and	(5)			
280.39	1664	_						
4" Benton: te Pellets (coated):	]	<b>!</b>   -						
283,6' → 286.0'		160 _						
	TEGALLILIKE,	]		-1 26 50 100	State C 1			
		<b>4</b>		178'-185' 51: qhtly 185'- 189' 511ty 5	sand (ms)			
All temp. casing removed:		] -	-089,000	189'- 195 Gravell	y 5and (65)			
All depths are in feet below	4663111166	200 —		195- 205 Sand	(s)			
ground surface.	4663111163	]  -		205-312 5:1tg	Sand (ms)			
	18/8###\$3	] -		212 - 215 Sand				
	4888111188	<b> </b>   -		015-226 Gravel	ly Sand (gs)			
	TECHTITIES	<u> </u>	- 50000	226 - 228 Sandy	Gravel (sg)			

	••		***		Page 2 of 2
WELI	L SUMMARY SI	HEET			Date: 07/16/01
Well ID: C3390		Well Name	299-E	33-337	
Location: South of 241-B Tank F	arm			CRA Orillin	16
Prepared By: c. martinez	Date: 07   16   01	Reviewed I		Weekes	Date: 8/13/01
Signature: Charlene Marting	08103101	Signature:	XCZ	kehes	
CONSTRUCTION DATA	A	Depth in		GEOLOGIC/HYDR	OLOGIC DATA
Description	Diagram	Feet	Graphic Log	Litholog	gic Description
All temporary casing removed. All depths are in feet below		320	50111015	259.5 - 265 ' 265 - 281 ' 281 - 286 ' B	endy Gravel (sg) Gravel (g) Troce sond Sandy Gravel (sg) asal T
ground surface.	-	-	_		

ERC Project:	22192			Prepared By: Gary B. Wagner, P.L.S.			
				Rogers Su			
Date Requester	<b>d:</b> 11/19/01		Requesto	r:	· · · · · · · · · · · · · · · · · · ·		
Date of Survey	: 12/05/01		Surveyor	: Rogers Sur	veying, Inc.		
ERC Point of (	Contact: M	Ir. Robert Bone	,0, 0	o. Point of Co Vagner, P.L.S.			
Description of	Work:			al Datum: N			
Civil surveying		groundwater we	ells Vertical l	Datum: NAV	D88		
in 200W & 200	E Areas.		Units: M	letric .			
				Area Designa			
Coordinate Sys	stem: Wash	ington State Pl	ane Coordinates	(South Zone)			
Horizontal Cor PUG & HVC-1	trol Monu	ments:					
Vertical Contr HSWB-032	ol Monume	nts:					
Well Name	Well ID	Easting	Northing	Elevation			
299-E33-337	C3390	573821.80	137193.87		Center of Casing		
				202.716	"X" on Rim		
		573821.82	137194.18	201.990	Brass Cap		
Notes:							
110tcs.							
Surveyor State	ment:	<del></del>	Certifica	tion Seal			
I Gary R Wagne	er, a professi	onal land survey	vor				
a, July D. Hught		hington (Registra	ation				
registered in the	· .	- , -	1				
registered in the No. 30440), here	by certify the	at this report is b					
registered in the No. 30440), here on a field survey	by certify the performed in	nt this report is b a December, 200	ı l				
registered in the No. 30440), here	by certify the performed in supervision a	nt this report is b n December, 200 nd that the data	ı l				

BHI-EE-202 (09/98)

			BC	REHOLE LOG		Page 1 of 10
Vell ID:	C33º		<del></del>	ame: 299-833-337	Location: C	Date: 07 l u lo i
Project:		RCRA			Location: South of 24	
		mple	<u> </u>	<del>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </del>	Reference Measuring Point:	
Dorth	Sai	ribie		Sample Des		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distribu Moisture Content, Sorting, Angula Size, Reacti	arity, Mineralogy, Max Particle	Depth of Casing, Drillin Method, Method of Drivi Sampling Tool, Sample Size, Water Level
o —	ALR	ULA	, .o	0-18 Sandy Gravel (56) 7	36% sand, 65% gravel	Air Rotary using
-		-	0.0	Predominately basalt 40	10 gtz(other) 1.0 10	tricone bit
_			:ö:0:0	basalt Sand-coarse	sub-rounded, gravel.	
-				mod sorted, sub-rounded,		·
5 —		↓	1	dry) grayish brown. S	•	
5 —	A roni va	1	0 0	pebbles < 35 mm. 5ligi	ht rxn to HCI.	Grab Archive Sample
			0.0			@ 5.0'
_			0.0			
			0.0			
10 <u> </u>	Areniva		2.0	10 Sandy Gravel, son	- 04 01-4119	Grab Archive Samp
_		1	0.0.0	Jarag G. aver, San	- WS 480 0C	@ 10.0'
_	.		0.00			10.0.0
-	-		0.000			
-	-		0.000			
15	- Archive	<b>.</b>	0.00	15' Sandy Gravel so	ame description as	Grab Archive Som
-	-		0.00	about.		© 15.0'
/ -	-		0 0 0		the second first	
•	-		0.0	18'-35' Sand (s). tra	ce gravel. 50°10	ļ
-	-   ↓			basalt, 50 % atz 6	other) c-vcse, S-R,	
$\infty$ –	- <u>Archi ve</u>	7		moderately sorted. Col	•	1
-	<b>-</b>	1		light brownish gray	. Sample moist. No	<u>න න බ ,</u>
•	-	1 1	ð	rxn to Hel.		
				<u> </u>		· · · · · · · · · · · · · · · · · · ·
  as	- <u>                                    </u>	1		8		Good Good S
	- 4.60/17					Grab Archive Sam
	_		8		.,,	3.0
	_					
•		$\bot$		3		
Report	ed By:	Charlen	· Mart	inez Revi	ewed By: DC Weeke	5
Title:	اعجمامع	) <u>5</u> T		Title:		
Signat	ure:co	reere W	`	Date: 07/u/o1 Sign:	ature: Na aleehes	Date: 8/13/0

Ţ			-	ВС	REH	OLE LO	 G		Page 2 of 10
Wel	II ID:	C 3 3 40		ı		1-83-337	_	Location:	Date: on I u los
						1-233- 337		Location: South of and	-B Tank Farm
FIU	ject. i	C401 6	RCRA D	c: Iling		· · · · · · · · · · · · · · · · · · ·	-	Reference Measuring Poin	"Ground Surface
	.	Sar	mple	, ]		San	nple Desc	cription	Comments:
1.	epth Ft.)	Type No.	Blows Recovery	Graphic Log		e Content, Sortin		on, Soil Classification, Color rity, Mineralogy, Max Particle n to HCl	
30	<del>-</del>	Archive	NIA		30' 50	une descrip	ption	from page !	Air Rotary
l	-			Ö	18-3	.5′			Grab archive sample
ì	_								© 30′
1	_							•	
	_		]						
<u>ا</u> .	_	<u> </u>	1 1		***	//		_ 4 .	
35	5 <del></del>	Araiva	1 1					1. Sand 85°10,	Grab archive sample
Ì		1	]	0.90	grave	1 15%, b	مغمات	40 10 , qtz (other)601	36
1	٠ –	-	1	9.0 .Q	sand	m~ vcse.	Trace	sile. Gravel - 5-A	c <del>t</del>
1	_	.	1 1		1	•		color LOYR 5/2 (gray)	
	_	_			4	•		0121219	
ĺ.,	_		4		1	) sample me			orm. LEL (a)
17	.o —	Annive	-{ }		@ 36.	o'. Basalt	50 b, a	tz (other) 50%, some	background
1	-	-			mica	, sand G-	vese .	SR, mod. sorted, gravel	God Archive sample
	-	-			S-A.	mod sorted	LZDmm	. Still gravelly sand	@ 40°
ì	_	_			COLOR	1042712	(Walte	9,000	
1	_	_			33'-	15' 5- 3/5\D.	20/2	d 50 gravel same	C
	_	-	<del> </del>		:1			•	6 rab archive sample
4	<b>-</b>	-Archins	4	0.0	1			tipeed square	<u> </u>
	-	-		0:0:				6. color WYR7/2	NO LKU 40 HCI
-	-	-  ]		0.0	45-	57 gravet		(38) 65 % Sand 650	t <sub>o</sub>
1	_	_		70. O				. 45° 10 basate, 55 1	
1		1 1	1	300		4			,
	•	_	_	0.0.3	רוני	other), mod.			Grab archive sample.
5	0 -	- Derin	익	0.00	Sorte	م تن عد عدم	=) pebbl	e color werzez	(a) 50°
-		-	1 [	000	45'	Strong rxn	40 H	<u>cı                                      </u>	
-			1 1	0.0	6	•			
-		_	1	0,0					
1		1 1		0.0.0				· · · · · · · · · · · · · · · · · · ·	
-			<u> </u>	0.00	:				
1	5 <b>5</b> -	<u> – arano</u>	<u> </u>	11773	ارد				Grab archive sample
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		_  \		0.00	0.125-€		<u>v 558.</u>		peroles < gomm
ţ	Repor	ted By: c	harbene			is to atiz, a	Revie	wed By: De Weeke	
[	Title: (	Seologi	<b>ナ</b> る	111			Title:	Geologist	
Į.	Signal	ture: co	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~ <del></del>		Date: 07/4/0	Signa	ature: SCUke ko	2 Date: 8/13/01
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ı			ВС	REH	IOLE L	_OG			Page 3 of 100  Date: 07 ( 1/0)
Well ID:	C-3390		Well Na	ame: 29	Q-E33-	337		Location: South of 2	
Project:	CYOI	RCRA	D ni Win	<u> </u>				Reference Measuring Point	Ground Surface
	Sar	nple				Sample		•	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group N Moisture	lame, Grain e Content, S	Sorting, A	\ngulari	on, Soil Classification, Color, ity, Mineralogy, Max Particle n to HCl	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
60 -	Arch:vc	ULA	Ö	60'-76	s' San	a (5)	05°6	sand, gravel 5%	Air Rotary
-	AIR		0	m- v	<u>ese, 5</u>	0% 6	asal	t 50°10 gtz (other)	Grab somple @ 60'
-	-							sorted sir color	
-	-		Ó					Jo LXV 40 HC1	
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66 -	Arenive	[ ]	O	<u>دخ′ -</u>	same.	desc	cipt:	ion as above	Grab Sample D65
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75 -	- Archive	1						"To sand, f-c, well	Grab Archive Sample
1	-					•		) 30° lo hasalt, S-R	@75'
	-			حصلمح	HOYR	لاككا	ight	brownish gray ) dry,	
	-			same	te mois	<u>s. 51</u>	ight	rxn to Hel	
	- \	<b>↓</b> ∤		<b></b>					<del> </del>
€ -	- Brezziva	-							Grab Archive
	-	1 1							sample@80'
١.	-	1 1		<b>}</b> —					
	-			<b>}</b>	-			<u></u>	
	- 1			<b>}</b>					
<b>85</b> -	# c9/20	4		185	Same.	<u> کامح در</u>	retio	on as above	Grab Archive sample
	7			<u> </u>	· · · · · · · · · · · · · · · · · · ·				@ <b>9</b> 5′
								<u> </u>	
	-			<b>}</b> —		<del></del>			
Repo	<u> </u>	<u> </u>	<u> 1993/95</u> J	<u>u</u>	· · · · ·		Revie	wed By: DC Weeko	
Title:	C- '	harten	- Mar	Tinez				Geologist.	
Signa	Geologi ture: 00	15 <u>5</u>	<u></u>		Date:		Signat		Date: 8/13/0/
13.3.10	<u> </u>	meene.	Wayne		Date: 07	MIOL	10.32.	- Cycerus	1

1		ВС	OREHOLE LOG		Page <u>4</u> of <u>m</u> Date: 07! u 10!
Well ID: C 3390	<u> </u>	Well N	ame: 299-633-337	Location: South of	···
Project: CALOL	D C e A	D -1 11 1	<u> </u>	Reference Measuring Point	141-b lank ranm
l Sa	RCRA	DKI ((	Sample Do	Reference Measuring Point	Comments:
Depth (Ft.) Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distrib Moisture Content, Sorting, Angu	oution, Soil Classification, Color,	Depth of Casing, Drilling
90 - Archive	n IA		90 Sand (s) 100%.	f-c. well-sorted	Air Rotary
- AIR	-		70 10 gt z (other), 30	% basalt, see	Grab Archive Sample
-			color 10486/2 (1: g	the brownish gray dry	@ °co'
95 — Archive					Grab Archive Sample  @ 95'
- Andrive			100' Same descri	etion as above	Grab Archive Sample
105 — Achive			105' sand (100°6) sam	e as 90'sample.	Grap Archive Somple
110 - Andrig	e.		100 Sand (5) 100° 10, 3.  70° 6 9t2 (0+her), 3.  100r 104K612 (2.)  Slight rxn to HC.	o % basalt s-R,	Grab Archive Sample  @ 110'
-	•		H5' same as abo	ue.	Grab Archine sample  @ U5'
L \	1 1		<u> </u>		
Reported By: c	No 101-		Re	viewed By: DC Uke Ke	5
Title: Geolo	cist	TYIAN	Titt	e:Geologist,	
Signature: 🕠	arlene ~	maria		nature: Maybekes	Date: 8/13/6/

-				<del></del>			
			ВС	OREHOLE LOG			Page 5 of 10
Well ID: 4	C 3 3 90	· · · · · · · · · · · · · · · · · · ·	<del></del>	ame: 299-633-337		Locations	Date: orlulo;
	C701					Location: South of 24	1-B Tank Farm
1 10,000.			Dr: 1/1:			Reference Measuring Point:	
	Sai	mple		Sample I	Desci	ription	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distri Moisture Content, Sorting, And Size, Rea	gulari	ty, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
120-	Archive	UIB		120' sand (5): 100°/0 50	and,	f-c well-sorted, 70%	Grab Archive Semple
_	1 1	<u> </u> -		atz (other), 30 6 basalt			
-	1	1 1		(dry) sample moist s	<u> 11457</u>	12H of ext 3	
_	.	ļ., ļ		124-125-138, 3	5; lt	4 sand (ms) 10%	Grab Archive Sample
125-	Anchive	1	-	15:15, 90% sand. 5	ana	vf-c, SR mod sorted,	۾ بيد ' کيدا ۾
-	. 1			color 104R 6/2 (119	int	brownish area) moist.	
-	-    '			RXN to HCI			
-	_						
_	.  _ _		12.74				
130-	- Archive	1		130' silty sand (m	ر (د	same description	Grab Archive Sample
_	- 1			as about			@ 130'
_	_				-		
_	_						
_	_						
135-	- Archive	-		135' Silt soul(n.)		05 130' 50 male	Grab Archive Sample
	1	7		Sam Cine	50.	me as the bumple.	ام ه
	_  ]				-		End of shift of 1/01
l .	_   -			138'- 178' sand (5)	`		CHOOL SHITE TO
				:1			
140-	_ <u>\</u>	4		poorly sorted 70%			
1140-	- Aruni va						Grab Archive Sample
'	_			HCI. (grayish brow	<u>wn)</u>		© 140
. '	_	<b> </b>					
	-			<u> </u>			
	-\ <u> </u>	_					
145-	- Acariv	٩		145 sand (s) sam		•	Grab Archive Sample
	-			above. 104R5/2	20	ayish brown. no	@ 145 '
	-			rxn to HCI			
	-			<u> </u>			
<u> </u>	<u>-</u>   ↓	1 4		¥		7.44	
Repor	ted By: ر	hartene	mart:			ved By: DCUkeke	<u></u>
	cologi					600/09/51	
Signat	iure: Co	arlens 1	natire	Date: or (ulo) S	ignat	ure: XC Aleeked	Date: 8/13/01

			В	ORE	HOLE	LOG	i			Page 6 of 10  Date: 07/12/01
Well ID:	Well ID: C3390 Well Na				99-E33	- Z > T	-	Location: South o	£ 741	-B Tank farm
			or: Ilir	19	1.033	<u> </u>				Ground Surface
		mple		-4		Samp	le Desc			Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Moistu	Name, Grain re Content,	Sorting,	istributio Angulari Reactior	n, Soil Classification ty, Mineralogy, Max I to HCI	, Color, Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
\50 —	Anhire	กเล ไ		150 S	and (s) 10	o°6 (	- 0 05	e, poorly sorted,	70°/0	Air Rotary
-	AIR									Grab Archive Sample
_				Samp	le moist	(900	wish b	to cxu+	oH CI	⊚ ≀ಉ′
-										
155	Anchive			155	same a	s abo	ve.n	oran to HCI.		Grab Archive Sample
-										એ લ્ટિક '
										a, B @ background
_			/ <u></u>		<del></del>		· 			
160-	Acchive			160'	sand (s	5 مر	ne 05	150' sample		Grab Archic Sample
_				-	<del></del>	-				a 160'
					· · · · · · · · · · · · · · · · · · ·					
_										
165	Archive	]		165	sand (	s) wo	% F-	cae operly san	ted.	Grab Archive Sample
-	-			700/0	qtz(ol	her).	30°6 h	asalt, color 12	4K5/2	@ 165'
-	-			1	•			ple malst.no		
-	-	]								
-	-									
סרי —	acchina	-		170'	sand l	<u>s) s</u>	ame c	es above desc	ription	Grab Archive Sample
-	1					<del></del>				<u>ລ ៶າວ′</u>
_	1									
]				}						
175 -	- Bresin			05'	sund(s)					
-	_	1		1175	34114 (3)	_50.m	<u>re 05</u>	abase.		Grab Archive Sample.
-	-					***	**		-	100
-	-			178-	185 51	igh <del>t</del> lu	s: Iti	sand 10% si	ز†ا	
	<u>-L V</u>	$\perp \downarrow$	7.5	90%	sand, v			sorted 30 lo b	عجواك	
Reporte	ed By: C	hartem	e Mar	rtinez	<del></del>		Reviewe	ed By: DC Uko	ekes	· · · · · · · · · · · · · · · · · · ·
Title: G	eologist	ξ			L			cologist,	,	
Signatu	re: كهي	mener	لمتلشع	<del></del>	Date: onli	<u> </u>	Signatu	e: Stapelle		Date: 8/13/61

			ВС	DRE	HOLE LO	OG		* *	Page 7 of 10
Well ID:	C 3391		<del></del>				Lagations		Date: וסובוורס
				anic. 2	×99-€33-3:	7 ح	Location: 50	wth of 241-	B Tank form
110,00		CCRA D	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1					easuring Point:	Ground Surface
• .	Sal	nple			S	ample Desc	ription		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Moistu	Name, Grain Si re Content, Sort S	ze Distributio ting, Angular ize, Reaction	ity, Mineralogy	fication, Color, , Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
180	Archive AIR	AIA 			85'(cont):				Air Rotary
_				light	brownish	gray. R.	in to HC	١	Grab Archive sumple
-			: <del>-</del> -	mice	ceous			·	@ 180'
-	]								
-								•	
185	Archive			185-	189' 5:1+4	Sand (n	15) 20%	silt,	Grab Archive Sample
-	] ]			80%	sand, vf-	vese, e	oorly sorte	ed, basair	@ 186'
-	] [				, qtz(oth				
-				IOYR	512 Lgray:	sh brow	n, dry) sam	rele moist	
-	↓		ランデルンド バラン・バン・バン		ng rkn to				
190 -	Archive		Ö						Grab Archive Sample
-			Ω	189-	195' Gra	velly San	d (65) 15°		
_			o.	25 %	sand. San	d m-vese	5-R, poorl	y sorted.	
-	1 1				15-A, max				
-					pt.z (odnei) qt				·
<b>।</b> ৭র —	Archive								Grab Archive Sample
_	1 1	.							<u> </u>
_				195'-	205 Sand	(5) m-	vcse, 5-R	- poody	
-	1 1				:4, 45°% h				
i –		ļ			2.5 4511 (gr				
ಎಎ—	Archive	]					•		Grab Archive Sample
-				202	, -245≤and (s)	v +-m	sa mod s	sorted. (	a 200'
	.]			ì	of descri		•		
-						<del></del>			•
_					_				
205-	Archive	]		205'-	212'	od (ms)	£ < a	lation l	Grab Archive Sample
_		]		1.601	o basalt.	_			@ 206'
	.				sand. colo				208
	.    .			10 10	Juin. 630	10 ye-2	10141.110	PAN TO HICE	0- 0
	.  , , ´		Z. ;;		×				Pm RCT + IH
Reporte	d By: C.	nartene	1ma=+>	n#7		Reviewe	ed By: /)/	!Weekes	An readings ok
Title: G	eologi	5T	11100-11	<u>.,, ,, C</u>			Se0/99		
Signatur	.e: C C	lere 1	~~~~		Date: ובו ודס.			Thokes	Date: 8/13/01
h			· ····································		511711	<u> </u>	-6/000	wyord	

			В	DREHOLE LOG		Page 8 of 10
Weli ID: ۵	C3390		Well N	ame: 299-633- 337	Location:	Date: סונוסו
		RCRA			Reference Measuring Point	-B Tank Farm
		mple	20.00	Sample Desc	Reference Measuring Points	
Depth			Canabia			Comments:
(Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distribution Moisture Content, Sorting, Angulari Size, Reaction	ity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
200-	Archive.	01A		210' Silty sand same de	escription as 205'	Grab Archine Sample
_	```i~		54.37			@ 210'
-				ZIZ - als sand (s) trace	silt. sand m-vose,	
_				poorly sorted, micaceou	5. 5-R. 65 10 basalt.	٠.
-				35 % gtz (other) 2.5 4 5		
೩೪೮ —	A retive		1	sample moist. no rxn H	<i>\( \)</i>	
-			9 () () ()	215'- 226 gravelly sand	(gs) sand 85%,	Grab Archive Sample
-			0.0	gravel 15°10, sand f-	c, pronty sorted	<u>૦ યક'</u>
-				se gravel mod sorted		
-			0.00	35 % oft color 10 yr	S/ gray (dry)	
220-	Arelive			sample molst. no rxn		Grab Archive Sample
-				= granules.		B 220'
-			0			
-			0.0			
-			o Q			
226-	Archive			225 gravelly sand (gs)	Same as zis'	Grab Archive Sample
-	1 1		2000	225 gravelly sand (gs)	Jus 6 grovel 354	225'
-			0000	sand, 70 % bas, 30 % atz,	gravel - mod sorted	
-			0000	228 grave/16/20 10 grav	el 10 % sand acquel	
				mex size, = pebbles, mad so		
230-	Acchine		1	·		C 1- 0
			0000	30 h gtz SR sand m-1	20%	brook Archive Sample
_	.]		0000 0000	230 sandy gravel (sg)	•	
_			000	sank fre poorly sorted, 5		Injected H.O
l _			0000	75 10 basalto, 26 to 182	(other) 10 Yeul1	
೨೩೪	↓		2000	weak ran to HCI		
1 455	Arthiu	4	0 0 0 0	235 Sandy gravel (59)	same as above	Grab Archilere Sample
	1		000			ର 23 <i>5</i>
-	1 1		000			
-			0.000			
-	1 <u>*</u>		<u> 0.0.3.6</u>	<u> </u>	5011	
Reporte	a By: صر	ar heme	mart;		0 1 1	
Little: C	وه له علاه	<u>,t</u>		Title:	ocolggist ,	
Signatur	e: <u>CD</u> a	-lae m	atting_	Signature ممارد المحن Signature	e: MCUKeked	Date: 8/13/01

			В	DREHOLE LOG		Page 9 of 10
Well ID:	C 339	.0	Well N	ame: ユ٩٩~ ૯૩૩~ ૩૩૦	Location:	Date: or liple!
	-	RCRA			Reference Measuring Point:	CU-B Fank Farm
		mple	011 (01	Sample Desc	ription	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distribution Moisture Content, Sorting, Angular Size, Reaction	on, Soil Classification, Color, rity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
240—	Archive A/R	010-	000	240' Sandy gravel (sg) 3	30 10 sand, 70 10	Grab Archive sample
	"	-	0.00	gravel. sand m-c, mod s		@ 240'
-			0 0 0 0	moderately sorted, max		
-			0.00	75°10 basalt, 25°10 gtz		
-			0 0 0	LOYR WII (dry) sample n		
a45 —	Archive MR		0.00	245' - some as abou		Grab Archive SX @ 245
_			0.00			
_			0000			
			0000			
250-	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1 1	6.0.0	200	\	(- ) 0
_	Archive	†	000	250- sundy gravel (st		Grah Archive sx @250
			0000	gravel graves mod sor	ted, max size = med	
_			0,00	exppres.		
			00.0	,		
	<u> </u>	↓	000		· · · · · · · · · · · · · · · · · · ·	
255 <b>—</b>	Archive	1 1	a a	255 - sundy gravel (sa	) jeavel max size =	600 Archive @ 255
-	1		0 0	cse pebbles.		
-	1		000		<del></del>	
-	1		0 0	258 - sandy gravel (st	) 30% Sand 20%	
-		_	000	gravel sand m-c, mod:	Sorted A-SA	H20@ 259.92 685
<u> کام </u>	Arenive	]¥ <u>*</u>		gravet mad surted max s	ize - mid pebbles	Erab Archive @ 260
-	spen	75%	00	color 10 YR7/3 ( very p		Solit Soon sx-7
-	· <del>  - Y</del>	<b></b> ₩-	000	weak rin HCI.		259.99 -> ZLI99 Bbs
-	-   'A'R		0 0	259.5 - becoming increa	isingly sundy	
-	-		000		Detales and lost	
265	Archive	†	ر د ۱۵	basalt 40% at Sand 4	D1. VCx. 40% CSE	Grab Archive @ 265
_	-	1	0 00	, , , , , , , , , , , , , , , , , , , ,	104R5/2 (brown), moset,	17101066 703
_	_		0.0	weak ren H()	TO IT IS COMMINING	
_	_		0.0.0	210 =11 = 1 5 :	the surveyed an eller	
.		1	0.000	Sund. 40% my 35/ graves	oble supported graduly	
Reporte	d By: 🖍	200.2	Ta: \	c martines Review	/	<u> </u>
Title:		\c.			C / Lind	·
Signatu	re:	1360	noting	Date: 7/13/01 Signatu	102 / 12	Date: 8/13/07
		Sterne	A	Tours (1/5/D) Tolgriatu	- / x Covered	Date. 0/13/07

					<del></del>	
•			ВС	REHOLE LOG	· · ·	Page <u>ID</u> of <u>w</u> Date: 7/16/01
Well ID:	(2350		Well N	ame: 299. E33.337	Location: South of 241	7/10/51
Project:		KRA Di		611.603-031	Reference Measuring Point:	
		nple	,,,,,,	Sample Desc	ription	Comments:
Depth <u>(Ft.)</u>	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distributio Moisture Content, Sorting, Angulari Size, Reaction	ity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
270—	archive	nla	ه. د	Gravel - mostly 2011 vosec	sc pebbles 40% med	Grahamhive at 270'
-	AR	ļ.		40% rfn-fn peb. 70% buss		
-	1 1		UU	Darly sunted max size con	nm. Sand: 201-va-ase	
-	1 1		0,0	40% med 40% fn-vfn. trave		٠,
-			00	Correyion brown, moist-net	, no ran HCI.	
275-	Archive	1	10.3	265 - Sandy gravel - some		Grab archive at 275
-	-		0.00.8	appears ground upby bit.		
-	-		1200	2701 - Sondy gravel		·
-	-		0000	275' - sandy Gravel (	st) 30% sand 70%	
-	- 1		80000	gravel trisitt. Sind	C-VCSC 50% baselt	
200-	Archive	1	80000	50% 9+2. mol sorted, Gra.	vel SA, med sorted,	Grab Archive Sample
-	-		35.02.85	Max Strad Csepabble.	IDYR 7/2. No rm	D 280'
-	-			280' - sandy gravel (59	). Same description.	
-	-			281'-286 Basalt, FI	rely ground, 95%	Grab Archive Sample
	-  ↓			basalt, 5% atz lother)	no rxn HCI	a 281.
285 —	Arthere	1-4NA		bbck		
-		++-		<u> </u>		Grab Archive Sample
-	- 180	الأ				D 782,
-	-	9/10	.]	TD = 286 bgs 0	rlulor	
-	-  ↓	1 pc	~		•	
290-	- Fronv					
"" .	_					·
		11				
.						-
	-	ļ				
295 -	_					
EIS .	_			•	V	
	_	.F				
	_					
	_			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
Report	ted By: c	Trice	\	1 Martinez Review	ved By: DCUkek	25
	600 h		16 eolog		Geologist	
Signat	עעיינא	A-Trice	martine	Date: O>\u_lof Signati		Date: 8/13/01
L	V-9 U- (	11.05 1/2	, just and	7	<i>U</i>	

					Start Date: 67/23	101	
WELL CONS	TRUCTION	SUM	IMAR	Y REPORT	Finish Date: ogl 3		
			_		Page 1	of _1_	
edification No.: 0 200X-5P-F	Rev. No.:`		\	Well Name: 199-€33-338	Well No.: C	3391	
CNS: NA				Approximate Location: SE con	ner of 241-1	3 Tank	Farm
oject: CYDI RCRA 1	or: Iling		]·	Other Companies: CH I			
illing Company: Resonant	Sonic Inc	s		Geologist(s):5th. Faurote, C B. Hudson, R.S. Ednington	martinez, J.	Hockin	7.
	driller #1930			B. Hudson, R.S. Edmington B. Raidi	, o.c. warkes	, -3, wime	117
	NG AND DRILL DEF	TH A	att 457	Control the Control of the Control o	OD/HOLE DIAMETE	R# *1	
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.	D./I.D.	Auger:	Diameter From	to	er gran
arbon Steel (F3) 12"	0'-50'	13"/#	5.5	Cable Tool: X a" 176"	Diameter From _ <	to	275.
arbon Steel (F5) 8"	ماتد - ٥_	91117-6		Air Rotary:	Diameter From	to	-
				A.R. w/Sonic:	Diameter From	to	
					Diameter From		
					Diameter From	to	
Indicate Welded (W) - Flush Joi	nt (FJ) Coupled (C)	& Thread	Design		Diameter From	to	
	<del>-</del>				<del></del>		
				Drilling Fluid: n/A	<del></del> -		
otal Drilled Depth: 1756'	Hole Dia @ TD:	12 11		Total Amt. Of Water Added During	Drilling:		
	<del> </del>		• O • • • • •	Static Water Level: 254.24	· -	,	
Passed #10101				AL LOGGING	Date. // 7/0/	<b>企</b>	ing in the
Sondes (type)	Interval	Da	W-44-10-12-14-15-15-15-15-15-15-15-15-15-15-15-15-15-	Colorada de Colorada de La Colorada Colorada de Colora			i de la
. , ,	0'-276			Sondes (type)	Interval	Dat	e
Spectral gamma	110 250	0/134	<u>nd8/14/6</u>		<u> </u>	<del>                                     </del>	
Neutron moisture	70-236	19/14/	01		ļ—	<u> </u>	
		e resolver	sas e vergos es	The control water Wiley Control of the control of t	ANDROS Vancta cue so acto	Zosai, sa Na 182	151.
	T	te i y	10,000,000,000,000	ED WELL	A Section 18 (18)		1,760
Size/Wt./Material	Depth	Thread	Slot Size	Туре	Interval Annual Seal/Filter Pack	Volume	Me: Siz
4 ID 55304L endcap	270.9- 271.32	F 480	CIA	Bentonite Holoplug (50" bucker	2715-27516	- 1 bick	74"
4 PD SE BOYL SCEREN	250.9 - 270.9	V	0.020	Colorado Silica Sand (50 beg	<u> </u>	- 22 Pags	
4 20 55 3044 Casing	+20'-250.9		n.a.	Bentonite Pellots (50 bucket)	231.0'- 241.0'	2 bucki	<i>ν</i> <sub>4</sub>
				Beatonite Crumbles (50 bas)	<u>مهدد - سُماما</u> (	87 6995	71
	<u> </u>		<u> </u>	Portland Coment (44 bag	<u> </u>	5 bags	ηι
	神经生态的	细胞)。	OTHER A	CTIVITIES	en Kristinia in		3
Aquifer Test: U/e// Deve	dopment	Date: 9	14/01	Well Abandoned:	Yes: No:	Date:	
Description: Using /hp 30	bmersible pump	o with	intake	Description:			
-4 +2/2 -40 1	withdrew wa	, ,	4	J			
			11111				
19 CUSPIN WITH O.O.	<u> </u>		WELL SU	RVEY DATA		Harack A	
at 20gpm with 0.02				医食物 医乳球性 医肾中毒性 医肠膜 医多数性神经病 化二甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基	e long ange properties and the long and the said	gerraffes betas 3.	1447,633
2(209pm W17h 0.02	And the second			Protective Casing Elevation:			
Date:	nales:	odale i Prija i Prija i Prija		Protective Casing Elevation:			
free Carrier Control	nates:	Such all what	กหน่ะห	Brass Cap Elevation:	*************		eria.
Date: Washington State Plane Coordin	NAME OF STREET	ં્ ભાગ	- It is a second at	Brass Cap Elevation:			
Date:	NAME OF STREET	Pay busk	* 1 buck	Brass Cap Elevation:  TS/REMARKS  \$\text{E} = 0.67 \text{Fc}; \text{ID=D S: \text{Is a}}	zárk => 33 podr	* 0.535	
Date: Washington State Plane Coordin	NAME OF STREET	Pay busk	* 1 buck	Brass Cap Elevation:	sand => 22 bags.		\$ 10
Date: Washington State Plane Coordin  Wol. Calcs: Bentonite  11:77 fc 5 Bentonite Rule	notephology Olos ets=> Olos ets=> Olos	Pay busk	* 1 buck	Brass Cap Elevation:  TS/REMARKS  \$\text{E} = 0.67 \text{Fc}; \text{ID=D S: \text{Is a}}	Sand=> 22 bags.		S. 10
Date: Washington State Plane Coordin	notephology Olos ets=> Olos ets=> Olos	-C 	* 1 buck	Brass Cap Elevation:  ISIREMARKS  LE = 0.6 2 FE; 10-20 Silica  Reviewed By: The Reviewed By	sand => 22 bages 1 Eag = 60 03; 10;		18/c

				<del></del>	Page 1 of 2
WEL	L SUMMARY SH				Date: 091(910)
Well ID: C3391		Well Name:	: >99-E	33-338	
Location: Size corner of 241-B Tank F		Project: و		RA Drilling	
Prepared By: C. martine 2	Date: ७२॥१९०।	Reviewed I	3y: 13CQ	leekes	Date: 9/20/01
Signature: conserve marting		Signature:	JXC4	leeked	. /
CONSTRUCTION DAT	Α	Depth in	G	EOLOGIC/HYDRO	LOGIC DATA
Description	Diagram	Feet	Graphic Log	Litholog	ic Description
w New 1. Noise protective casing set		- 0	81215104	2-12 5: 114 Sand	GRAVEL (mag)
above stainless casing		-	1000		ravelly SAnn (mg S)
4 TO 553044 casing: +2.0' -> 750.9'		40-	0-20-5	145 -200 silty	SAND (mS)
Portland Cement Grout:		-	50 no	31.0' - 35.5' ai 1t;	SARO(mS)
Granular Bentonite		80 -		52.0 <sup>2</sup> -57.7 <sup>2</sup> still 57.7 <sup>2</sup> -66.3 <sup>2</sup> 58.01 66.3 <sup>2</sup> -763 <sup>2</sup> still <u>e</u>	cy sand(ms)
4"ID \$53044 0.020-in. Slot  cont. wire-wrap well screen:  250.9 >> 270.9  Bentonite Pellets:  236.0 >> 241.0		120 —		71.3'-72.3' 5Ant 94 5 72.3'-78.3' \$11ty 94.5'-1045' \$11ty 104.5'-114.0' \$11ty 114.0'-127.6' \$1	SAND (m5) SAND (m5) SAND (m5)
10-20 mesh silica sand:		160-		1670-1695	sitty sano (m5)
4" ID 55304 End cap.  >>>> >> >> >> >> >> >> >> >> >> >> >>				1750 - 203.5 ( (sporadic)	SING SAND (m5)
Dentonite Holeplug:		J.00 -		)   212.5'- 212.0	ulty sano(ms)
All temp. casing removed:  All depths are in feet below  ground surface			- 6 5 2 C	2180' - 222.4' 223.4 - 258	site to sandy sitt (m. o'silty Sandy GRAVES

, , , , , , , , , , , , , , , , , , , ,					D 0 -1 5
WFI 1	L SUMMARY SH	IEET			Page <u>2</u> of <u>2</u> Date: <b>09</b> (2010)
Well ID: C 339)		r	: 200 6	33-338	Date. 0 11=0101
		l .		cea Oridin	<u> </u>
ocation: SE Corner of 241- B To	Date: 09 1 19101	Reviewed		wekes	Date: 9/20/01
Prepared By: c. mertinez	54174101	Signature:	- Ka	alea los	120/01
Signature: Charles Martines  CONSTRUCTION DATA	Δ	o.g.na.a.o.	<del></del>	SEOLOGIC/HYDROI	OGIC DATA
CONSTRUCTION DATA		Depth in	Graphic		
Description	Diagram	Feet	Log	Lithologic	Description
•		240-	95 0 S	<u></u>	
			2000		•
		<u>-</u> -	\$5-5-5	258-271.0 50	undy Gravel (Sb)
		_	000000		4
		ļ _	3.0.3.9	271- 275.75	Basalt
_		1280-	manual History		
		_			
		~ _			
		_			
		_			
		3-0-		エロミ >>6 > 4	has
		300-	Ì	TD= 275.75 Static Wate	en leval et
	-	_		254.24 bg	c (9/4/01)
	<del> </del>	-	]	237.27 09	prow
		1		i <sub>e</sub>	
		-	]	`	
			1		
		-	1		
	-	-	-		
		-	-		
		-	-[		
	_	-	-		
	_	-	-		
		•	-		
		.	-		
		.	-		
		-	-		
All temp. cosing removed:	_		-		
Au depths are in feet belo	<b>7</b>				
ground surface		<u> </u>	_[		<del></del>

ERC Project:		WELL SURV		Prepared 1		Wagner, P.L.S.
				Сошрану:	Rogers Sur	veying, me.
Date Requested	11/19/01			Requestor	•	
Date of Survey:	12/05/01			Surveyor:	Rogers Surv	eying, Inc.
ERC Point of C	ontact: M	r. Robert Bone		-	Point of Co agner, P.L.S.	ntact:
Description of \	Work:				l Datum: NA	AD83(91)
Civil surveying	for eleven a	roundwater we	118	Vertical D	atum: NAV	D88
in 200W & 200I	Areas.	TO MILE TI MINE TO		Units: M	etric	
			}	Hanford A	Area Designa	tion: 200E
Coordinate Sys	tem: Wash	ington State Pl	ane C	Coordinates	(South Zone)	
Horizontal Cor PUG & HVC-1						
Vertical Contro HSWB-032	oi Monume	nts:				
Well Name	Well ID	Easting	No	thing	Elevation	
299-E33-338	C3391	573912.07	1.	37238.24		Center of Casing
					201.107	"X" on Rim
		573912.11	1	37238.58	200.260	Brass Cap
Notes:						
Surveyor State				Certifica	tion Seal	
I. Gary B. Wagn						
registered in the	<del>-</del>					
No. 30440), here						
on a field some	norformad i	n Docomhor 7/11	"	1		
on a field survey under my direct						

BHI-EE-202 (09/98)

			В	OREHOLE LOG		Page of _19 Date: 07/23/0/
Well ID:	C3	391	Well N	ame: 299-633-338	Location: SE from SE Con	1/25/51
Project:		9 2001	Drille	•	Reference Measuring Point:	
_		mple		Sample Desc	<del>'</del>	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distributi Moisture Content, Sorting, Angula Size, Reactio	rity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0-	5PLT		T (2010)	0-7' Silty sand	ly Gravel (msG)	cable tool
_	SPUT SPOON #1		ŏΟ̈́	G= 65% (50% cr 40	70m, 1070F), 2590	cont. split spoon
-		100% recov.	200	sand (20% cr 60% w	1, 20% + ) and 10%	
2 -	1540 hs	,,,,,		silt in poorly sorted	dry to slightly	moisture sample @2
	55 #2		2	meist SR-SA grain	ed unit	•
3-	#2	40%				
_	1600	recov.	0.02			mototure sample Q4
4-	55 #	_	0-0-0 0-0-0		•	
	1	•	0.20	1 7 7 1	msg) Same as	Grab Anhlve.Q.s.o'
5-	27/24/9	50% rec.	10 R.	above strong run Hel	. Gravel => max size	
6-	0815		0.30	med copple		moisture sample DS1.76
_	20		little	7- 14-500 5: 1ty Sandy Gr	avel (mog) 6 65°10	
7-	22		0,0	Sand 25 10, 5:12 1010,	WYR 6/2, slight color	
_	40 KBJ		1 2 1	chy from above, poorly	•	d, 30 background
8-	55*4	_	recovery			LEL, CO, OR LOOT.
9-	1		20.2			,
'-	194	75%	0.5			Grab archive @ 10'
10-	ARCHIVE	ATCHIVE		·		moisture sample @
_	1311 hrs	†	1000			10.4
n-	-	5500				
-	-	530 10	8			
12-	1350		0.0	25 - 14.5' silty gr	welly sand (mas)	
	55 ± 4	,	Do.	55 10 sand, 25 to grav	vel, 20% silt, sand	moisture sample D
13~		0		cit and the	wel SR-SA, poorly so Ad	12.51
14-	-	100%		145 5:17 lens 100	to sitt trace sande	
	- 14331	<b>X</b> S		gravel		moisture sanole O 146
		MFauro	telc.	Martinez Review	ved By: DCUkeke	5
Title:		ist \	<u>Geolog</u>		Geologist,	
Signatu	re: m	auroto	1C-Mat	Date: 01/23/01 Signatu	ure: SCAJESKEL	Date: /0/16/07

•			ВС	REHO	OLE LOG				Page <u>a</u> of <u>19</u> Date: paylot
Well ID: c	-3391		Well N	ame: ചඉඉ	-633-338		Location: SE	orner c	of 241-B Tankfarm
Project:	6401	RCRA	Drilli				Reference Measu	ring Point:	Ground Surface
		nple			Samp	le Desc			Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log		Content, Sorting,	Angulai	on, Soil Classificationity, Mineralogy, Man to HCl		Depth of Casing, Drilling Method, Method of Driving Sam∌ling Tool, Sampler Size, Water Level
15		Archive	D-77-D	150 -15	S) siltu sa	ndu G	ravel (msg) 6	5%	Grob Archive Q 15
-	55, <sup>™</sup> 7		<u> ਹਾਂ≎-ਠਾਟ</u>	gravel,	٥	2.	sile. sand	f-cee	
16 -			0.0	SR-SA	Poorty son		gravel se, po	ocly_	
-	.	100%	0	Sarre	٠ م		1) 30% basal	<u>*                                     </u>	·
17 -	.	rec.		חם האו	3			· · · · · · · · · · · · · · · · · · ·	
_	151977			15.5-16	Isity Grave	ک پیلا	and. 75 4 5	and,	maisture sample 12.5
13 -	55*8			10000	ravel 15°1	2 <u>51 (</u>	t, sand, Vf	- <u>es</u> e_	•
-	- \	۰,		poorly s	orted, SR. q	رمعو	1 Frank mad	sorted,	
19 -	-	100 %		مثلث	dules, 300/	e ba	salt 70 (0	#2	
-	1859	1, 0		no exn	HCI			<u> </u>	moisture sample 195'
20-	-	A rehive		16.5'-	<u>20.0/5:1+y :</u>	Sand,	85° 6 sand,	15.0	Grab Andive D 20'
-	55*q		No	بمتلتب	sand uf-	c.5 e ,	poorly sorted	, S R ,	
21 -	- \ \ .		50	بمحوط	t 25°10, 9t	z (ot	her) 75%	<u>00 FXD</u>	
	-    07  25 0	906	0.5	N.C.			·		
22.	065	<u>.</u>	806	(20.0' -	-25.5) Silty	San	y gravel Cm	156)	moisture somple 6 22.4
-	- 55 <sup>22</sup> (C	·	万。深	Sam	e description	on a	is.o'		
23	-  /			8					X, B@ background
	-  /	90%	<b>A</b> 3.2	<u> </u>					LEL Sdetect.
24	-  \	rec.	$\mathcal{X}^{\bullet}$	Ď					
1	07.39	-	0 0						moisture sample @ 745
25S -	55#11	- Archiv	000	25.5	-275/51:ght	ام 5:	Ity Sandy Grav	<u> </u>	Grab Archive@ 25'
l l	-[		253	علنك إ	, 25% sand	, रे० '	6 Gravel. S	and	
210	-	100%	2.0.9	<u> </u>	cse 5-A,	اءوعج	y socied, Go	ربو) ماطا <del>ن</del> ت	4
	-  1	سود	23	-11-5	Borted, 5-R	<u>-&gt;5-</u> 6	, max size s	m pebbb	6-A
277	1001	-	9.9	30%	bosolt, 70°	6 9t	elother), 10 Y	rslz.	maisture sample @ 27.0
-	55±1	<u>à</u>	60°	S deart,	sh brown. I	<u> </u>	in HC1. Trace	<u>cobbles</u>	
275	- 1	100%	5065	9 225'-	<u>- 282/) 5:11+</u>	San	14 Grave) (ms	خ) لو <b>ح</b> آد	·
	-	1000	0 0	grave	1, w 6 5:1+	^کد	lo sand . Sand	vf-cs+	·
29	-	-	0,0	<u> </u>	onty sorted, q	Lave 7	SR-SA, poorly o	HC) Since	
<u> </u>	- 115	<u> </u>	7.0	كاعديك	other) 20%, 1	<u>د . هوط</u>	2 10 1048 ME	C brown	sh moistur sample @ 21.5
	rted By: <sub>C</sub>	Charle	no Mo	rtinez			ewed By: 1)CC	week	හ
Title:	Geol	Deisz			<u> </u>	Title:		<i>T</i>	by what
Signa	ature: C 5	Darlone	traft	ne -	Date: 07/25/0	Sign	ature: / XC 'Afe	PRIL	Date: /0/16/01

BOREHOLE LOG						Page <u>3</u> of <u>19</u> Date: -7 ( 25 lo)
Well ID: دعكمر			Well Name: 299-E33-338 Location: 3E corner .		9	
		RCRA			Reference Measuring Point:	C A C C
		npie	<u> </u>	Sample Des		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distribut Moisture Content, Sorting, Angula Size, Reaction	arity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
30 —	55,13	Archive	11e 33 3 28 - 31 Slightly sitty sandy gravel		Grab Archive @ 30.0'	
_				10% silt, 40% sand		
31 -		100%	2 8 9 0 7 7 0	m-rose, SA, well sorted SA, well-sorted, trace	, gravel, sm pebbles.	
32 -	1213hs	rec	0	75 % gtz Cother) 104R (		moisture sample @ 1919
33 -	55*14	80%	<b>0</b>	31'-35) 5:1+4 Sand.		
34 -	1300	_	0.5	5and S.R. mod sorted 5% < 30% basalt, trace gra	with to XIC Ulz grayish	moisture sample @ 34'
35 -		archive.	0474 1	5x-35/5) Sond 95 by f - 6	s: IT se, mad sorted, SR,	
36 -	55*15		000		1 6 ravel (MSG) 15 % x 17	CEL Coletect
37 -	- 134556	100%	200	26 son) 55 10 gravel so sorted, SH, gravel SH,	moderately max size	moisture sample Disss
38 -	55 #16	75% rec.		om cobbles loy RCIZ It	an HCI.	
39	LEIO hrs			45 / 12 grown   sand f - m		meisture sample at
40 -	SS # 17	S5%		med; 0% cse max six	ce 19 petable. 10 yel	39.5
41	1597 hr	à	000	gray. Gravel pred bas	1	) brob Archive 40.0
42	- 20		0.00	<u> </u>		moisture sample
43	- 55#	re	000	// O. E		
મ અ	- P8 4	100°%	, 20 C			moissur sample Q445
Reported By: Warken Martinez					ewed By: DCWeek	eS .
Title: Geologist					Geologist.	
Signature: Charles Mate. Date: 07/25/01 Signature: Wedleshed Date: 10/16/0)						

.*			ВС	REHOLE LOG		Page 4 of 19
Well ID:	C3391		<del></del>		Location: 5 & Connec	Date: 07 26 81
Project:				ame: 290-E33-338		- of 241-B Tank Form
	1	RCR Y	1 00		e Description	Ground Surface.  Comments:
Don'th.		iipio	0			· · · · · · · · · · · · · · · · · · ·
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Moisture Content, Sorting, A	stribution, Soil Classification, Color, Angularity, Mineralogy, Max Particle Reaction to HCI	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
45 -	07/26/01 -0740	Archive.	$z^{\circ}O$	45 same description	as 37, sage 3	Enab Applica QUS!
-	55 19	ļ.	20			Moisture sample of the
46 -	-		0.80		·	(3)
_	_	100%	50	5'1+, Saml. 6	Sound (MEC)	
47 -	_ 08.23 has	Hec.	5º 8	Sitty Sandy 6	ng. Gravel 65%, sand	
~'_	55 # Zo	1	OS	26°12 512 11 6	ravel max size = 5m	
48 -	_		25%	1		
"	1 1	100% pec.	2 o	cobbles. Strong or	n MCI	
49.	- 0952	_	5.0		*.	
,,,	2/20		9.0°			moisturesample 2422
	10/	A cob b	0-0(			
80 -	55 #21	100000	122			Grap Archive Q 82.0
.	-  <sub>1</sub>	Recovery	2		· · · · · · · · · · · · · · · · · · ·	
51.	-  \	85%	50			<u> </u>
	- loo ha	TREHIVE		51.5 - 52.0 S/17	_	Grab Archiro DSIS
52		-	D-0:	with sitty sandy are	ruel. Silt. 85 /s ptz	Moistare Sample @ FTG
-	_ 55≯.22.		7.2.		very well sorted non-	530
53	-	100°6		plastic 25/6/3 1:	ght bellowish brown (dry	)
	-	150 %		No IXM HCL.		
54	1605					Molstune Sample @ 545
	- No			520 -525 Silty Son	ndy Gravel (msg) Gravel	
55 -	- 55	ductions.	7		silt bolo. Sand f-cse,	Grab Archive @ 55
	- ss # 23	4		penty sorted SA-SR	, grand poorly sorted St	
56	- 33 723		13-13-		le bosalt, 104RC12	
1	_	100% rec.	7. F	·:	ing ran. Hcl.	
57	_		12.5		4	
۲, -	0658			Sa.5 - 57.7' Sut	u Sand (ms) 5:12 25 %.	moisture sample @
58	55 <sup>#</sup> 24	<i>'</i>		5and 75% uf-m	mod socted SR-SA, silt	57.7
	_	100% 100		nodules 104R.51Z	grayish hrown Strong	
69		100.000		rxn McI	gragion moun.	•
רכ			0 O	ricka no.		
Repor	1 0 7 4 1 ted Bv: 5	harlen.	_ <u></u>	3.1	Reviewed By: 1) Clare K	7.5
Title:	C- '		· War	T: N47	Title: Geo/pg/st	-
Signa	<u> (حواه</u> ture: م	gist.	100	Date	Signature: Wabeless	Date: 10/16/01
	(J)	بصوصة	MAN	Date: Orlolol	July Capacital	1500.19/10/01

			D.	OREHOLE LOG		Page <u>5</u> of <u>19</u>
						Date: 7/27/01
Well ID:	C339	11	Well N	lame: <u>299 - £33 - 338</u>	Location: SE Corner	of Z41-B Tank
Project:	RCRA	1 Dr:1	ing 1	Y 0 1	Reference Measuring Point	Ground Surface
• ,	Sar	nple		Sample D	escription	Comments
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Moisture Content, Sorting, Ang	oution, Soil Classification, Color, ularity, Mineralogy, Max Particle ction to HCl	Depth of Casing, I Method, Method of Sampling Tool, Sa Size, Water Le
60	55 # 25	ARCHIVE	G 6	57.7' - 66.3' Sand [	S]: 95% sand, 5%	Grab Archive 6
_	]	. 100% rec.		gravel; sand: med v	Coarse, well sorted,	
61 -			•	1 3	NO RXN. to HCI; gravel:	
	0807				XN. to HCI.	
	55 th 26			J STERVIES CE TAMAT NO	AN, TO HCI	1.
62 <del>-</del>		100% rec.		0!		
				@ 59.9 grave incre	,	
63 <del>-</del>				size still granule (2-4.	im); still a sand [S]	
-	0848	-		(90% S, 10% G)		
64 -	SS# 27					·
-	1		40	@ 61.3' silt increas	es to 5%, gravel	Grab Archive 6
65-	-	100%rec.	2	decreases; still a s	and [S]	
· -	.		-	(90% S 5% M 5	% 6)	<u> </u>
66 -	0956	ARCHIVE				
_	$\supset$			66.3' - 71.3' Slight	y Silty Sand [(m)s]:	
67 -	55 428			··l	• •	
				10070 SANA, 1070 STAT, U	% gravel; sand:	
		100% rec.		med V. Coarse , Med. So	rt., NO RXN to HCI;	
68 -	1 1		2.00	silf % higher, rxn to	HCI; gravel the	
-	1855	ļ		same, No rxN to HCI.		<del></del>
69 -	35 # 29	1			·	
-	- 1		- 00	71.3 - 72.3 Sand	[S]: see above	Grab Archive (
70 -	-	100% rec.		description (95% S,	5% G , trace siH)	1
-	-	ļ				
71 -	- 1053	ARCHIVE	- °° :- °	72.3' - 78.3' Silly	Sand [mS]: 80% sand,	
-	. ><	]	2	20% silt, trace grave	1: Sand: fine - med .	
72 -	\$5 #30 -	]		well sort. No rxn to 1	C1. sub. and - sub. rad.	
_	_			4	igher; gravel trace,	
73 -	_	100% 124.		当 ,	2 mm).	
'3	_			: max size = granule (	- mm/:	1
ارب	12.16	4		9 75'	ا مر ا الفراد ا	<del>                                     </del>
74 -	- (SS # 3)	1		M	eases to 5%; rxn	<del> </del>
		1		to HCI 7/silf. (75%		
Reporte			Hackin	1	viewed By: DC Weeke.	2
	Geologi	s <del>t</del>		Titl		
Signatu	ire: 🕜	u Hack	2md	Date: 07/27/01 Sig	nature: Mc Weekes	Date: /0/1

			В	OREHOLE LOC	}			Page 6 of 19 Date: 07/27 /01
Well ID:	C 3391		Well N	ame: <u>299- 633- 33</u>	8	Location:	SE Corner o	f Z41-B Tank Farm.
Project:		Drillin				Reference		Ground Surface
		mple	3 7		ple Desc			Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Moisture Content, Sorting	Distribution, Angulari Reaction	ty, Minerald	ssification, Color, ogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
75 —		100% 18c.		78.3'- 79' Slightl 75% Sand, 15% s	y Silt ( ilt , 1	Gravelly 0% grav	Sand[(m)gS]: el; sand:	Grab Archive @ 76'
76 -	1236	ARCHIVE		v.fine - mad. (see	descript	-ien Pag		
- 77 -	332	140% rec.		gravel: sub. ang rxn "HCI.	sub. rnd.	; sili	% down,	
78 - - 79 -	13.47 55.#33	- 100% rec.		79'-94' Slightly (see description po	5:14y	Sand [ , ran t	(m) 5] : . HCI "/s;II.	
80	1421	ARCHIVE		@ 89' sand be	comes	fine - u.	Gine .	Grab Archive @ 80'
81 -	\$\$#3¥	100% rec.	0 1	gravel still @ 5 strong rxn to t	% <u>a</u>			
87 - 83 -	55#35	100% 186.	0 0					
84 - es	1523 55 # 36							
86 -	- - -	100 % rec.	1 000					
87 -	0725 55 # 37	ARCHIVE	] **					Grab Archive @ 87'
88 -	-	100% rec	0 0					
89	0755	7		\$	<del></del>		<del></del>	<del> </del>
<u> </u>	-	<u> </u>	a - : : : : : : : : : : : : : : : : : :	耛	ln. i	7	11/2-6	
Report		Tass Hoc	king		Review		CUkeke	
Title:	Geologis	<del>†</del>		· · · · · · · · · · · · · · · · · · ·		50/99	1151	/ . /
Signati	ure:	Harring		Date: 07/27 /01	Signatu	re: / X C	aleches	Date: /0/16/0/
·EE-	7 183 (12/97)							, ,

			В	DREHOLE LOG	*			Page 7 of 19  Date: 7/31/01
Well ID:	C3391		Well N	ame: 233 - €33 - 338		Location: 5F	Caraca of	241-B Tank Farm.
Project:	RCRA	Drilling	Fy o			Reference Mea		
-		nple	.,,	Sample D				Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distri Moisture Content, Sorting, Ang Size, Rea	ularit	ty, Mineralogy, I	ation, Color, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
%	SS # 38					· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
91 — —	0978	100% rec.	* T					
92 -	554.57							
73 -		100 % rec.						
94 _	0850	ARCHIVE		94'- 104.5' Slightly	Silf	Gravelly Sand	[(6) 4 5]:	Goah Archive @ 94'
_	53 # 46		8° -	94'- 104.5' Slightly ( see description page	).	75% sand	15% silt.	
95 — - % —		100% rac.	00 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 % gravel.				
97	55 # 41 -	100% rec.	80 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	@ 98' sand is find		med well	sorted,	
99 -	55 # 47	100% rec.		silt oxy to HCI: weak				
100	-	100 A FC.	0.00					
101	1038	ARCHIVE					<u>.</u>	Grab Archive @ 101
102 -	55 # 43							
i03 -		so % rec.	0 0	·:	ne -	med. well	sorted;	
104 -	- ss # el q			silt exn WHC1: string.				
Reporte	ed By:	Jess Ho	cking	Re	viewe	ed By: DC	Weeke	<u>s</u>
Title:	Geolog:			Titl	le:	Geologi	ist	
Signatu		u Hock	mgf	Date: 7/31/01 Sig	natu	re: X	Ukskos	2 Date: 10/16/01

<del></del>		<del> </del>	ВС	REHOLE LOG	<del></del>		Page <u>8</u> of <u>19</u> Date: 7/31/01
Vell ID:	(3391		Well N	ame: 233- <u>E33- 33</u> ;	R	Location: SE Corner 4:	
roject:		Drilling	FY OI		<u> </u>	Reference Measuring Point	Grand Syclain
<u>.</u>		mple	F7 01	Sam	pie Desc		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size I Moisture Content, Sorting	Distribution	on, Soil Classification, Color, ity, Mineralogy, Max Particle	
105 —	1225	40% rec.	+ 		•	d [m 5]: 80% sand,	
ioe —	55 # 45			,		sand: fine - u.fine, sill % back up,	
107 -		100 % rec.		, ,	vel % vilar to	description page 5 )	
108 -	1320 55 # 46	ARCHIVE					Grab Archive @ 108'
109 -	-	100% rec.					
110 111 -	1348 558 47	no% rec.					
1172	1433						
113	-	100 % rec.	•	G 114' - /27.6'	۲ د	S]: 95% sand.	
119	- 55 # 49	ARCHIVE		5% sill : sand :	u.fine	•	Grab Archive @ 114.45
115 -		100% rec.		to sub. and. , no		to HCI, well sort.;	
116	- 1011						
117	- \_						
118	-1/			######################################			
119	55#5	160% 16		@ 120.5' trace	gravel	appears, max size =	
Repo	rted By:	Jess 1		1. 14 Sitt. Propie.	Revie	ewed By: DCWeek	හ
Title:					Title:	Geologist,	
Signa	ature:	2 Hoch	ing	Date: 7/31/01	Signa	ature: Majorhes	Date: 10/16/01

			ВС	REHOLE LOG	·	Page <u>9</u> of <u>19</u> Date: 7/31/01
Vell ID:	C3391		Well N	ame: 299 - E33 - 338	Location: SE Corner o	f 241-B Tank Forms
Project:	RCRA	Drilling		*	Reference Measuring Poi	nt: Ground Surface.
-		nple		Sample D	escription	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distril Moisture Content, Sorting, Ang Size, Rea		
/20		100% + 46.			,	
,	0655	ARCHIVE				Grab Archive @ 120.5
121 -	$\geq$		.00			
_	\$5 % \$1		69			
122 -			(1)	····		
162		100% rec				
	07/10	1			.1 , , ,	
123 -	55 # 51	1		@ 123 trace grave	el no longer present;	
-	1   '	1		sand: v.fine - v. coarse	1 ; still ~ 5% silt.	
124 -	-	100% rec.	5			
-	-					
125-	- 0608	ARCHIVE	- 22		·	Grab Archive @ 125.3
-	55 # 53	+				<u> </u>
126 -	-					
.	-	100 % rec.		<u> </u>		
127 -	-					
-	0856	1	(1.5.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	127.6 - 136 5:1	ty Sund [mS]: 80%	
128 -	- \ /		10.20		and: v.fine - med.;	
	-l X	ļ		silt % increases : ( see		
129		7			1 1 1 1	
127	SS # 54					
	_	109% rec.				
130 -	_	100 % 142.				
	_					Grab Archive @ 131.3
131	- 0732	ARCHIVE	一类	<u> </u>		Grab Hrchive @ 131.3
1	$\neg \mid X$					
132	55 # 55	7		<u> </u>		
-	— <u> </u>					
133	-	100% -				
	-	İ		<u> </u>		
134	10 23	ARCHIV				Grab Archive @ 134
	_ _					
Repo	rted By:	Jess	Hockin	R	eviewed By: Dukek	ළ
Title:	Geol				itle: Geologist,	4
Signa		1. 1/2	10	Date: 7/31/61 S	ignature: ACURER	Date: 10/16/01

			ВС	REHOLE LOG			Page 10 of 19 Date: 7/31/41
/ell ID:	C3391		Well N	ame: 299- E33- 338	Location: SE C		
roject:		Drilling	FY 0		Reference Measu		
	San				escription		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distril Moisture Content, Sorting, Ang Size, Rea			Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
135 —							
_		· 100% rec.					
136 —	<u> </u>	100.07.00	40.4	136' - 143.15' Sand	[5]: 95% sac	 .el :	·
,,,,,	1156			5% silt; (see descrip	1,		
-	55 # 57			3% SIIT ; (See descrit	then page 6.7		
137 —							
4	·	100% rec.		<u>.                                    </u>			
138 —	1						
-	-						
139 -	1243	ARCHIVE					Grab Archive @ 139'
	-	ł					
140 —	_			@ 140.8' sand: fin	e - med. well so	rt.	
		100% rec.		still ~ 5% silt.			
	1326	1		St. 11 - 3 78 S. 14.			
141 -	55 # 59	Ţ					
-	-						
142 -	-	100 % rec.		<u> </u>			
_	_	ŀ					
143 -	1401	<u> </u>		143.15' - 167' Silly	Sand [m5]: 809	6 sand.	
١.	55 # 60			zo% silt; (see desce			
	<u> </u>	1		20 8 311 1 368 243(1)	Prien Page 2.1		
144 -	_	100% rec.		X <del></del>			
\ ·	-						
142 -	1445 55#61	ARCHIVE	<b>□</b> 378	<u> </u>			Grab Archive @ 145
	-  "	1					
146	_						
1	_	100% rec.	100 (100 <u>100</u>				
147	1						
141	1545			(4)			
-	$\overline{}$	1					<del></del>
148	- 552 6	7		\$\\\			<u> </u>
	-						
149	_	100% rec		<b>9</b>	<del></del>	• .	
		- [					
Repo	rted By:	Jess H	ckine	R	eviewed By: DCA	keke	·s
Title:			J	Т	ille: Geologis	_	
	ture:	NI	1	Date: 7/31/01 S	ignature:	1hollo	Date: /0/16/0/

			ВС	OREHOLE LOG			Page <u>II</u> Date: 7/31	
Well ID:	C 339	1	Well N	ame: 299- £33- 338	Location:	SE Corner of		Tank Farm.
Project:	RCRA		FY 01			Measuring Point:	Gravad	
		nple		Sample D	escription			mments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distri Moisture Content, Sorting, Ang Size, Rea	bution, Soil Class ularity, Mineralog ction to HCl	sification, Color, gy, Max Particle	Method, M Sampling	Casing, Drilling lethod of Driving Tool, Sampler Water Level
150	1616 55#63	ARCHIVE		See description on	0.10		Goob Ace	hive @ 150'
151 —	55.263	100% rec.						
153 -	0704 55 #64	100% rec.						
154 -	20 80 I	100% rac.						
15% -	OR 58	ARCHIVE					Grab Ar	chive @ 156'
158 -	55 # 66	jos% rec.						
159 -	0976							
160 -	- 100 7 55#68	100% rec.					Grab A	chive @ 161.
162		100% rec						
164	- 10 30 - 55 BL				•.			
		Ц	747	<u> </u>				
Report	ed By:	<u>ess 46</u>	cking	Re	viewed By:	CUkekes	·	
Title:	600/0			Tit	ie: Geolo	gist,	·	
Signat	ure:	Meeke	2 Kal	55 Hock Date: 10/16/01 Si	gnature:	Thehes	Da	ate: 10/16/01

DUI EE 402 /42/07

			В	REHOLE LOG	L	Page <u>12</u> of <u>19</u> Date: 08/03/01
Well ID:	C33	91	Well N	ame: 299 - E33-338 L	ocation: SE of 241B	
Project:	2001 K	PCRA 1	rilline	F	Reference Measuring Point:	Ground Surface
	Sar	nple		Sample Descri		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distribution Moisture Content, Sorting, Angularity Size, Reaction t	, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
165 -		100% -46.				
_				***		
166 -	12 JJ 45 # 70	ARCHIVE				Grab Archive @ 166'
167 -		106% rec.		167'-169.5' Sand [S]:	95% sand , 5%	
-	1			sitt; sand: v.fine - med	1. , sub. ang. , well	
168 -	1239 55#71	1		sort. No run to HCI; sil		
-	1	_		strong own. to HCI; (see	description page ).	· · · · · · · · · · · · · · · · · · ·
169 -	1	100% 100.				
-				169.5' - 171.45 Silly Sand [ms		
170 -		┪		description page 10. ) 80:	% sand, 20% silt.	
-	- 55 # 77Z					
171 -	-	100% 126.				
172 -	1			171.45' - 173.05 Sandy Silt [		
''' _	1501	ARCHIVE		25% sand; Silt % lacre	•	Grab Archive @ 172.5
173 -	$\geq$		4-1-1	sand: v.line - fine sub.	-	Grab Hichive & 172.3
' ' .	55 # 73			, WELL SOCK , NO 1841 - 40 FC	, n decreases.	
174 -	_	100%		173.05' - 175 Silty Sand	Γ., 5] : (see	
``` .	_	1		description page 10.) 80%		
175 —	1610	Archive	4.50	175-203,5	32.22	Grav Sample @ 175'
	_\ /	Henve	<b> </b>	by 175' the unit is Sana	((5) with sporadic	
176	_l X	10070		Lenses of u.sl. silty sand		
	_ / \	rechier		Sand (1570c1 40% m, 40.		
177	- 55#74	il /		The grains are SA some S	· · ·	
-	_	$\nu$		Size is 4mm or less, an		-
178	-	1		moderately sorted. This		0
1	- 67/6			exhibits a weak rxn to		
179	-1	オ		also shows 14 to 12" in	ch whitish-gray	
-	<u>-  ^ </u>		<u> </u>	: cemented (slightly) node		
Repor	ted By: 🗸	ess Ho	cking/	Imfaurot Reviewe		25
Title:	des	kehea	. 4 *	Geologist Title: 6	Seo logist	
Signal	ure:	less Hock	ing my	auro Date: 08/03/01 Signatur	e: /NCARIRER	Date: 10/16/01

	· ·	ا حول	В	DREHOLE LOG		Page <u>13</u> of <u>19</u> Date: <u>0</u> 8/03/0/
Well ID:	C3	<del>381</del> 339	Well N	ame: 299-E33-338	Location: SE of 241-	·····
Proiect: 2	2001 R	CRAdr	Illing			int: Ground Surface.
		nple	iiriq	Sample D	escription	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distrit Moisture Content, Sorting, Ang	oution, Soil Classification, Colo	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
180	55#75	Archive	-	ivk-moderately well a	1 HCI. The unit	Grab Sample 180'
_				contains mica (m.		vė
181 -		95%		and possibly phlog		
182 -	0802 55#76	recovery				
183 —					<del></del>	
184 -	0835	-				
185 —	X	Archive		6185, the average of to cr & ver, approp		Grabsample @ 185°
186 -	SB# 77			30% m and 15% f	w/ 5% st (or less), [	'nit
- - 181	-   hi	100% recaen		continues to react me continues to be dr		
188 -	SS#78					
189 -	-	100°/0			1 0 8 408	
190	206	Archive		30-35% f , 5-10	to 20% cr, 40% om, 90 sitt in 1t 94-	bn Grab Sample @ 190
191 -	55#79 - 1 190.4	1		sand	6 42	1 264
192 -	12464	a l			-192 , max 6, ~ 12 45-55% bosale a	
193	95# 8 192.4	1				IH PM check - < detectable
194	194.6	1	0			CUERCIUNIE
Report	ed By: 🎣	mF au	mle	<u> </u>	viewed By: DCUkek	<u></u>
Title:	Gunta	arst.			le: Geologist	
Signati	ure:	8011	sto	1 18/ /	gnature: Stabolica	2 Date: /0/16/01

			В	DREHOLE LOG		Page 14 of 19 Date: 08/03/0/
Well ID:	C	3391	Well N	ame: 249-E33-338	Location: SE from 241	<del></del>
Project:	0011		ling		Reference Measuring Point	
	Sar	mple	,,,,,,	Sample De		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distrib Moisture Content, Sorting, Angu Size, Reac	ution, Soil Classification, Color, larity, Mineralogy, Max Particle tion to HCl	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
ns —		Archive			,	Grab Sample @ 195'
	.[\ /					dalcasing 20165 now
196 -	.l X			Continues as sand,	m-crarnd w/	
-	$\frac{1}{2}$	Ī		moderate amt of F		
197 -	   55# BI	ļ			nent (CO3") that extin	\$ <i>*</i>
_	-	]			C. SPORADIC uf gra	
198 -	-	100%		(5A-A, 14" to 3/8").		Ind shift 8/03/01
-	-	recovery		, , , , , , , , , , , , , , , , , , ,		////
199 -	1432h	ļ	ر (۱			Start 08/06/01 @ 1991
-	-  🔍					
200 2001	;/ <u></u>	1 /				Grah Sample @ 200."
-	S5#82	Archive		Sandis 55%c	r, 30% in 10% fevt,	,
201 -	-	100%		with 5% sitt, th	at is comprised of 60%	<b>3</b>
-	-	recovery			bn w/ gy-wh CO3 rem	
202 202	0212 h	\$ 1		The sand has a mod-sg	exotoHCl	
202	<u>,   &gt;                                  </u>	<u> </u>				
203 -	55#83					
-	-	100%	d	203.5-212.5 Sh.	gravelly sand,	
204 -	-	recovery	-00	vf-fgravel @ 15%	osavelly sand, o, silt sloor less, a	nd
24	1 0748 h	3	0.00	Sand @80% (as des	cribed above)	Grab Sample @ 205 A
205 -	-1>	Archive				
205.	52 # 82	i	9	6	·	
206	-	(m. 5)				
	-	100% recover	000	by 206.5 There,		
207	_ 0859 H		0.0	17	% (80% F, 20% m, 4)	
367		7	0.00		4"). It is basalt rich	<u> </u>
208	-	7	ò, o	and reacts med to so	to HCl.	
Ì	55, 8		0.00			
209	-	1000/0.	0,000	0:		
		recovery	1800	(0) (v)		
Report	ted By:	Maurote	:	Rev	iewed By: DCUkeke	5
Title:	Ledog	ist ,	<u> </u>	Title	Geo/09/st,	
Signat	ure:////	wrote		Date: 08/06/01 Sign	nature: Scalechea	Date: [0/16/0]

			ВС	REHOLE LOG		Page <u>15'</u> of <u>19</u>
	C 33	21	Well N		Logotion CE /	Date: 08/06/
			14461114	1110. J99-E35- 330		241-8 Tank Farm
Project:	10011101		ng		· · · · · · · · · · · · · · · · · · ·	Point: Ground Surt
•	San	nple .		Sample I	Description	Comments
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log		gularity, Mineralogy, Max Pa action to HCl	Color, article Depth of Casing, Method, Method of Sampling Tool, S Size, Water L
210 210.1	0920 65	moisture Tu Archive	2 8800	max gravel size is 17	2x1"x 3/4" Gravel	Graf Jample e
-	55#86	· ·	0.	content ~ 25%, s.	ilt incr to 8%	
Z11 -	.]		0			·
_	.	100%	0 0	·····	· · · · · · · · · · · · · · · · · · ·	
	]	recovery	o – · ·	)		
212 -	1949 hg	moisture TIN	0 00	0	1 are c 1 rd	5 //
212.5		1		212.5-216 Sa		>1/E,
213 -	55#87	(	SLOUGH	the sand is tobot	otan, SR-SA, V.f.	to-A
-	-	90%		grained, It rxn to	HCI. Locally the	sand
214 -	-	recovery		15 whitish gray with	h moderately abund	ent.
-	-	Moishure In		CO3 cement		
215 24	- (150 hr	Archive		11/10/216	- 218 Silty Sand.	Grab Sample @
_ ا	_\_\			SILY LOUIS It conten	tincreases to 10	
215.1	55#88			in anotherwise uf		727
216				in anomerwise vi	-1917asana.	
1 -	-	100%				
217 -	-	recovery			· · · · · · · · · · · · · · · · · · ·	
217	7 1230 h	smoisture tin				
218 -	-  🔀	1		218-2224 Silt to sa	ndy sitt - Chocola	
.			连至	brown w/ Vf-fgri	ndsand. 20% Si	and @218'69s
219	55489		1.5	and 80% silt.	It shows v. thin	lenticular
\	_	100%		med ter grained	lonses of sand	
220 -	_	recovery		distributed through	,	Grab Sample
1	13201			- (		
	<u> </u>	Archive		4	ecreases to near	
221	-1-196	Tin & 220.8	-	-1 '/ '	trace to about 3-	376 · IIGUIFICE
	-	330.8		clay, and the un	it is moist to st.	111
222	-	1	555	<u> </u>		SA- The SS weep
227	14231	nd व	$\mathfrak{D}_{0}$	Q 272.4- 258.0' SI	Hy Sandy Gravel	, SR, It IS NOT safe
223	- \ /	could no		3 10% Silt, 35% san	d, 55% Gravel (40	3% RCTPMchack
	- V	frive .	60	cr to sm pebbles 309	% m 30% F) ands	and Is this
224	_ ./\	barrel		13 20%cr 50% m 3	30% f-vf in a mois	t, rabn Hanford
	_ <del>/</del>	7		2 (2 )		x2" large clasts ere
Repor	الا حجالة ted By: ر	Mfauro	~			kes
Title:/		L'	<u>.                                    </u>		. 2000	
$\vdash$	70109150	2.	<del>/-</del>		Sec. Aller	Date: //
Signa	ture: 4///	<u> AMM</u>	les_	Date: ~ 1/66/6/ S	ignature: XCAKER	Date: 10/

			ВС	ORE	EHOL	EL	оG				•		of 19 8/06/01	$\Box$
Well ID:	C 3:	391	Well N	ame:	299	-14-18	FIF.	338	Location	on: <i>SE f</i> .	rom 24			7
Project:	2001 K	CRA DI											d Surface.	
		nple				;	Sampl	e Desc			:	Į.	Comments:	$\neg$
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log			itent, So	orting, A		ty, Min	Classification eralogy, Ma		Method, Sampli	of Casing, Drilling Method of Drivin Ing Tool, Sampler e, Water Level	ig
225	control	Archive	missing	7	Conti	nues	as v	poor	y sorz	tedgra	vel.	pushe	d large rock	
-		60% recovery	02:0	ac	tual si	ilty-si	<u>andy</u>	-grav	el. 7	Le unit	/3	a/ show	e, limited reci	ve
2.26 -		ر ا		ove	rall u	<u>yh-94</u>	bn	with	003	as Cen	cot	Grab Sa	mple @ 225	
-	1524 hg	moisture tin		the	at reac	ets me	rd to	59 W	th He	I. Maxi	grain			
227 -	55#f92		000							x2" The				╛
	351192 		500		Very poo	_								
228 -	1	100%	400											
_		recovery	ŘŌ%										,	
229	0712 h	moisture	982											
_			2000											
Z30 —		Archive	000									Grab Si	mok @ 280'	
230.2	SS# 93		00000	61	avels	vee n	verna	ps /-	"//2"	remain	·	7.5		
231 -	]	ļ	U Sec							% m, 30%		.) /	<del>.</del>	$\neg$
			89							t. The u		ĺ .		╗
	1 0820 h	MOSTURE	20.7							(xn to			,	
2 3 2 3 2 .		71177	9 e 0	1/42	3119111	,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	MIC CIS	ry cu y	1271 10	1) <u>L</u>			
		J	200			<del></del>						}		
533 -	KSHOW	]		3	16.00	1.0	1	Tac 1						$\dashv$
1		95%	ngo							). 51ight		·		
234 -		recovery	/ROOM							hty moist	-			$\dashv$
1	12401.	. ا		<u> </u>	sh-gy	bn. (	CIMU	<u>دا ا</u>	1/2"			ļ <u>.</u>	1 0 00 01	-
235		ALL STORE					•		<del></del>			Carabs	ample @ 235'	$\dashv$
235.8		ARCHIVE	-1035g	6								<u> </u>		
236 -	- 45+95		MISSING	, 50.					t ga	avel to	2/2"	poor	recovery in	$\dashv$
-	-	880	Ob.	2	and dr	<u>^Y.                                    </u>	<u>sligh</u>	thy le	55 Sc	ind.		Shoe	for moistare	<u> </u>
237	-	Recover	1323	9 2 —										
	13176	MOISTURE	MASING	<u> </u>								ļ		
7.37. 7.38		7 312	OF GI	<u></u>									<del> </del>	
:	<del>.</del>  X		( S	Ó								<u> </u>		
239 239	- 65# qu	7	200	2 5	1ty-50	ndy-G	ravel	Gra	vel to	0 1/24			·	
			200	S M	: \- Coars	e san	J. 5	itally	BH L	less siff	than do	we		
Report	ed By:	nfauro	le i	BILL	HUUSO	ر ا		Review	ed By:	DCU	keke	5		
Title: (	Ted og	st	· ·			1		Title:	60	0/09/51			-	
	. /	nt Bien 1	udom		Date	e: <i>08/6</i>	7/01	Signatu	ire:	SCA	peker		Date: 10/16/0/	/

			ВС	REHOLE LOG			Page <u>17</u> of <u>19</u> Date: 8/7 (01
Well ID:	1339	(	Well Na	ame: 797 E33 338		Location: SE from 341-	8 Tank Farm
Project:		RCRA				Reference Measuring Point:	
-		nple		Sample D	Descr	iption	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distri Moisture Content, Sorting, Ang Size, Rea	gularit	ty, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
z40			2550	Gravel rounded to 5	م کان	ingular. Slightly	
_	1467	ARCHIVE		moist . Strong rxn u			Croab Sample 240'
2410-8	7	MOISTVILE		(60-9, 25% Mis,	15%	si1t)	
_	X						
242	55#97	1	880 V	silty-Sandy-Gravel.	64	avel rounded to SA.	
-		100%	O. C. E	strong ran willer.	. (	ay-wh. slightly	
243 -		reovery	,80°	Moist. Few oxide	<u>M</u>	offes, coarse, distinct	
243.9	1501	- '	200	Gravel to 11/21.			
244 -		MOISTURE	0886				
-	55#98	ARCHUE	-6. <i>14</i> 9				Grab Sample 2951
245 -	-	V		Same as above ex	œp	t more mothes,	
-	-	100%	1200	and gravel to 2	212"		
246 -	-	recover	686			·	
-	100	MOTOR	1990 S				
247	\$5,99	<u> </u>		Gravel is domi	nan	tly 1/2" to 11/2" with	1
_	- 33777		20° \$	pebbles/cobbles to			
248 -	-	100%		are mainly basalt,		, ,	
-	-	recovery	OED OF	The grave's are SR			
249 -	0047	n pisture	0.00 b	poorly sorted, It C			
	- \ /		200	Fe Ox stained silty	(10	0-12%) , sandy (35%)	
250 -	-l X	Achive		gravel (53-55%).			Grab Sample @ 250
	- / \		76 Q				
251	- 55# 100	วี	0.00	V. sdy 250.5-252	, 50	11 down to 8-10%; Q	
<u> </u>	-		0000	252 silt back to	12-13	5%	
252	-	ŀ	200	, S		· · · · · · · · · · · · · · · · · · ·	
-	- 0812	hos	20	<u></u>			
253	-\	his moistur		<b>X</b>			Thole naving behind
ĺ	- \	/		ž			the drive barrel and
254	-I X	ľ	905				the casing is tree
	<u>-  /                                   </u>	<u>\</u>	0:0;	Ď		50.1	falling: secured casm
Repor	ted By: {	BILL HUD		Trauro		wed By: DCUkeke	S
Title:	(1809)	LENTIST	16,e00		itle:	Geologist	la de la la
Signa	ture: Bû	go fludos	~{\m}	auroto Date: 8 3 01 S	Signat	ture: /XCapehla	Date: /0/16/0/

BHI-FF-183 (12/97)

			ВС	REHOLE LOG		Page <u>18</u> of <u>19</u> Date: <u>08/08/01</u>
Vell ID:	C3.	391	т-	ame: 299-E33-338	Location: SF ( - 21)	0/00/0/
Project:		0.44	<u> </u>	VII L 35-528	Location: SE from 241	
			rilling		Reference Measuring Point	Ground Surface
	Sar	nple	1	Sample Desc	cription	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distributi Moisture Content, Sorting, Angula Size, Reactio	rity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Drivin Sampling Tool, Sampler Size, Water Level
<b>255</b> —	X	Hz0 Approx		Continues as whitish	l-gy-bn silty sandy	Archive sample mis
	/ \		9-20	CHAVE WY CHASTS 25	MAK, M= 12.70, 5=	1/2 250
266 —	55# 101	Ţ	2000	6 / / -		H20 ~ 256
	101		30.O	Saturated splits	poon - 5//ty	
257-			0950	sandy Gravel as a	m DIEVIOUS DAMO	IH Tech
		recovery	2000	This contains cobb	bloc >6"	1 de Let
258-	MULL		1300°	· ···· Companies Copp	15 0	-ucreas
200	K 3.00	mousture TIN	De l			
-		-	9-90	19 basalt cobble in		
259-	$ / \setminus$			258 3 Sundy Gra	vel, silt content	
	55# 102	1		is 5% or less, sand is	: 40% and cravel 55	large broken cobb
260-		Archive	Ore Se	of this variegated in color	quartaita com	in drup stan some
	For	45%	2000	A Land A Least 1	+ yuuri eine, gheiss,	55#102 from 108/00
_	sieve ,	recovery	000	granite and basalt class		4102 from 100/00
261 -	10451		ONE	that is very poorly sor		
-	1		3.20	The average clast size	= is 1-2", with th	
262-	Drive	}		maximum about 5		
_	1.			to sub-round in sha		
263-	Barrel			- v swo I will will shap	K& •	
245-	<u> </u>		O AV			11111
_	-		5		<del></del>	Edetect Y.P. ~
264-	-					
-	-		0			
265—	_					
145		Archive		1 1 155		
-	-	Ì	Co V	V. sdy 265.5-	w/ Ig. pebbles #	
266	-			sen cobbles in gener	ally finagrained	
-	-	-	RITO X	Gravel.		
267-	_		<b>EQ</b>			
100	1		2:07			
	-		7			<del> </del>
268	-					<u> </u>
	-	1		2		
269.	_	1	22	<b>4</b>		
" "	_		0.90	5		
Renort	ed By: 17	mE.		Pouls	wod Bus DA 11/2-6-	1
I		MFaul	000		wed By: DCWeeks	<u>د</u>
$\overline{}$	7.00/00	gist_		Title:	Geologist	<del></del>
Signatu	110: //20	4 .	1.	Date: 108 / 01 Signal	Juras Mr Dlag /land	Date: 10/16/0

			ВС	REHOLE LOG		Page <u>/9</u> of <u>19</u> Date: 08/08/0/
Well ID:	C37	391	Well N	ame: 299-E33-3394N	Location: SE from 241-	
Project:	2001 81	CRA DO	illing		Reference Measuring Point;	Ground Surface.
	Sar	npie	7	Sample Des		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distribu Moisture Content, Sorting, Angul Size, Reacti	arity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
270-	Drive	Archive			· · · · · · · · · · · · · · · · · · ·	
_	Barrel	NA	37	~		endshift 08/08/01
27/-	.		13054 F	I Basalt Contact @	271'	end 54: A 08/01/01
_	Hard					Coxing scated
272-	100/			h., /		m 271'
		1 1		TDOAN	bas on 8/10/01	
222		\		27/2	-1	
273-	]			picul	<b>.</b>	
	1	-				
274	-					
-	-		1.74			
275-	-					
-	-l V	V		275.75	<del></del>	
274-	-					
-	-	1				
277	-	1				
_	_	1				
278-	_					
	_					
270	_[					
279.	_					
1	-					
280-	-	ļ				
	-	. 	ì			
281	<b>'-</b>		1			
ļ	-  •	Ì				<del> </del>
282	!					
-		-				
283	3_	1				
	_					
289	<b>%_</b>					
~ ′	_					
Repor	rted By:	1 m	finaz 1	25 Edringtion Rev	iewed By: DC Weekes	
Title:			mee/	Title	Geologist	
	ture:	logist SII	, RS E		lature: Mapular	Date: /0/6/01

RHI\_FF\_183 (19/97)

		-			Start Date: 7/1	7/01	H				
WELL CONS	TRUCTION	1 SUM	RY REPORT	Finish Date: 8/17							
02007-5P-1					Page _/_	of <u></u>					
	Rev. No.: O			Well Name: 299-633-339	Temp-Well No.: c	3392					
ECNs: NA	<del></del>			Approximate Location: SE corner of 241 - BX Tank Farm							
Project: CYOI RCRA DO	illing			Other Companies: CH			1				
Drilling Company: Resonant	Sonic Inc.				z, C. Trice, D	cwee	Kes				
Driller. M. Gomez		CONTRACTOR OF THE PARTY OF THE		J. Hacking							
TEMPORARY CAS	NG AND DRILL DE	PTH 🛬		DRILLING METH	IOD/HOLE DIAMETE	Ri .	5-75				
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.		Auger:	Diameter From	to					
Carbon Steel	<u>D - 280.7'</u>	103/1"	10/e"	Cable Tool: フた"OD	Diameter From	to	50'				
10344/101/24				Air Rotary: 10" 103/7 ACW	Diameter From 50	to-	26¥				
				A.R. w/Sonic:	Diameter From	to	<b>∠85</b> ₩				
					Diameter From	to					
					Diameter From	to					
*Indicate Welded (W) - Flush Joi	nt (FJ) Coupled (C)	& Thread	Design		Diameter From	to					
						<del></del> -					
285.44		- Vow		Drilling Fluid: Avc			a),				
Total Drilled Depth: 204	Hole Dia @ TD:	1074	0"	Total Amt. Of Water Added During	Drilling: N/A S	or ale	ard.				
Well Straightness Test Results:	NOT RUN			Static Water Level: 261,27	Date: 8/21/0						
		%∳ GEC	PHYSIC.	AL LOGGING A TELEFIA 7 - 25	· V · · · · · · · · · · · · · · · · · ·	<b>**</b> **********************************	<b>李</b> 沙···				
Sondes (type)	Interval	Da	te	Sondes (type)	Interval	Dat	te				
Spectral Gamma	0'.55'	7/27	101	Weutron Moisture	0'- 120'	7/26	701				
Spectral Gamma	54'-164'	7/30/	101	Neutron Moisture	120'-240'	177	101				
Spectral Gamma	163'-262'	7/31/	101	Neutron Moisture	240'-263,25	1/ = 1	6/01				
	<b>设施工作的</b>	as y c	OMPLE	TED WELL (1) 10 12 12 12 12 12 12 12 12 12 12 12 12 12	Files Bally	77 - T	******				
Size/Wt./Material	Depth	Thread	Slot Size	Туре	Interval Annual Seal/Filter Pack	Volume	Mesh Size				
4" 1D endrap, 55	2/7.3 281.4 381.4 - 283.4	F480	_	Colorado Silica Sand	249.7 - 283.8	79.38	10-20				
4" ID green, SS	259.4 - 279.3	F480	0.020		244.4 - 249.7		14+30				
4 " 10 - asing SS	+2.00 - 259.4	F480	-	Portland Conent	0'- 10.4'	#16.52					
				Bent Abllets (carled)	283.9- 285.8	1.14	3/3"				
				Bent. Crumbles	10.4 - 244.4	254.8	-				
A CONTRACTOR OF THE PARTY OF TH	和工工的基础	And the	THER A	CTIVITIES	447000000000000000000000000000000000000		8-14				
Aquifer Test: //e// Dev	elopment	Date: 8	biloi	Well Abandoned:	Yes: No:	Date:	and the second				
Description: Using / hp 50	bmersible pu	now	th	Description:	<u></u>						
Intake set@ 277 At	bas withdress	" Waster.	for								
120 minutes at 20 gpm	with a obs	7.C+ C	laub								
<b>在中央的第三人称单位的</b>		Na cac v	VELL SÜ	RVEY DATA	5-10. AF5. C. 11	<b>建</b>					
Date:		a made of the stage of the stage	y a r management milital i gradi imagili	Protective Casing Elevation:							
Washington State Plane Coordinate	ates:			Brass Cap Elevation:							
THE COURT OF THE	NEW TOURS	· C	OMMENT				the state of				
Vol. Calco	The state of the s	TATELY, GATE	ye in set of the set of the			28 P 4 27 4 27	Section 1				
			<del></del>				·				
Reported By: C. Trico				1	7						
Cities		1			eker	<del></del>	7 7				
<u> </u>	<u> </u>	Date:	<u> </u>	Title: 69069151	<i></i>	Date: 0	118/01				
Signature: Mcaloches Y	2 C. Trice			Signature: SCAbel	162						

WELI	_ SUMMARY SI	HEET	V		Page 1 of 2  Date: 07/18/01
Well ID: c 3392		r	399-5	33-339	
Location: SE Corner of 241-BX	Tonk Form	Project: c	YOI R	CRA Dri	lline
Prepared By: Iess Hocking	Date:	Reviewed	By: DCW	eekes	Date: 9/19/01
Signature: Jun Hocking	***************************************	Signature:	ACZIL		
CONSTRUCTION DATA	Α				ROLOGIC DATA
Description	Diagram	Depth in Feet	Graphic Log		logic Description
6"-dia. protective casing set above stainless casing:  4" ID SS 304L casing: +2.00 -> 259.4'  Portland cement grout: 0 -> 10.4'  Bentonite crumbles:  10.4' -> 244.35'  14" +38" Bentonite pellets:  244.35' -> 249.7'  4" ID SS 304L 0.020in. Slot  cont. wire-wrap well screen:  259.4' -> 279.3'  10-20 mesh silica sand  249.7' -> 283.1'  4" ID SS 304L Tailpipe: 279.3'  8 Bentonite Pallets (coated): 283.1' -> 283.1'  All depths are in feet below		000		5-6 Backf 6-18' 5:114 S. 6-18' 5:114 S. 6-18' 5:111 S. 6-26' 5:111 18'-30' 5:124 18'-30' 5:124 18'-30' 5:114 18'-31' 5:114 18'-31' 5:114 18'-31' 5:114 18'-31' 5:114 18'-32' 5	ill Material  andy Gravel (moe)  ysitty Sandy Gravel  ysitt Gravelly Sand  ysitt Gravelly Sand  sandy Gravel (msc)  ysand (ms)  ysitt Gravelly Sand  ysandy Gravel (msc)  ysand (ms)  ysand (ms)  ysand (ms)
ground surface.		/// ///	- 88 18 18 18 18 18 18 18 18 18 18 18 18		

Well ID: C33 92  Location: SE Corner of 241-Bx Tank Farm Project: RCRA FY-01  Prepared By: Jess Hocking Date: 8/17/01  Signature: Si	LAITE	1 CHMMADV C	JEET			Page Z of Z
Description  Description  Diagram  Description  De		L SUMMART SI	,		· · · · · · · · · · · · · · · · · · ·	Date: 7/18/01
Prepared By: Jess Hooking Date: 8/17/01 Reviewed By: CWeekes Date: 9/19/01  Signature: S						
Signature: Aching CONSTRUCTION DATA  Description  Diagram  Depth in Feet Graphic Log Lithologic Description  240 - 252 Gravel (6)  252 - 253.5' - 254 Is sith sany frauel (6)  253 - 254 Is sith sany frauel (7)  260 - 275' Sandy Gravel (8)  280 - 285.44 BASALT  To = 285.44 BASALT  To = 285.44 BASALT	JC COMET OF LAT UK .		<u> </u>		,	Data: alia la
Depth in Feet Depth in Feet Graphic Lithologic Description  Depth in Feet Depth in Fee	7	Date: 8/17/61	<del> </del>	- K	/ //	Date: 9/19/01
Description  Diagram  Depth in Feet  Graphic Log  D50'-252 Gravel (G)  252-253.5' Sitt (m)  253-253.5' - 254 st sith say fravel (G)  260'-275' Sandy Gravel (G)  260'-275' Sandy Gravel (G)  260'-275' Sandy Gravel (G)  275'-279' Sith Gravel (m/n  279'-264' BASALT  TD = 285.44' BASALT	The processing		Signature:	· / · · · · ·		201 0010 0474
Description  Log  Log  Deb'-252 Gravel (G)  252-253.5 Sit (m)  253-5-254 il silty sand fravel (G)  254-250 Gravel (G)  254-250 Gravel (G)  255-254 il silty sand fravel (G)  255-279 Silty Gravel (G)  275'-279 Silty Gravel (G)	CONSTRUCTION DAT	T T	Depth in	<del></del> i	SEOLOGIC/HYDI	ROLOGIC DATA
250-252 Gravel (G)  252-253.5' Sitt (m)  252-253.5' Sitt (m)  253-253.5'	Description	Diagram	Feet	Log	Lithole	ogic Description
All temp. casing removed:  All depths are in feet below ground surface.	All depths are in feet		320	0.000 May 10.000 May 1	252-253.5' 253.5'-254' 254'-260' 216'-275' 279'-254' 285.44	Silt (m)  al silty survey firmed (ms a)  Gravel (b)  sandy Gravel (s a)  silty Gravel (mb)  Gravel (a) Acw  BASALT  27 tys 8/21/01

RHI-EE-189 (12/97)

EDC D ' '		WELL SURV				Wagner, P.L.S.
ERC Project:	LL 192				By: Gary B. Rogers Sur	
						,
Date Requested	: 11/19/01		]	Requestor	•	
Date of Survey:	12/05/01	<del></del>	5	Surveyor:	Rogers Sur	veying, Inc.
ERC Point of C	ontact: M	r. Robert Bone			. Point of Co	ontact:
Description of	Work				agner, P.L.S.  l Datum: NA	AD83(91)
_			-		atum: NAV	
Civil surveying in 200W & 200I		roundwater we	iis [	Units: M		
			- 1		Area Designa	tion: 200F.
	W 7 1	· -4 04-4- D1				
Coordinate Sys			ane Co	ordinates	(South Zone)	
Horizontal Cor PUG & HVC-1	itrol Monu	ments:				
Vertical Contro HSW0-032	ol Monume	nts:				
Well Name	Well ID	Easting	Nort	orthing Elevation		
299-E33-339	C3392	573716.86	13	7221.51		Center of Casing
			1		203.027	"X" on Rim
<u>.</u>	<del> </del>	573716.84	- 13	7221.84	202.303	Brass Cap
				<del></del>		
Notes:	1,	<u> </u>	<u>i</u>			
, totes,						
Surveyor State	ment:			Certifica	tion Seal	
Surveyor State	eri a professi	ional land surve	yor		•	
I, Gary B. Wagn	er, u projessi					
I, Gary B. Wagn registered in the	state of Was		1			
I, Gary B. Wagneregistered in the No. 30440), here	state of Was by certify the	at this report is l	based			
I, Gary B. Wagn registered in the	state of Was by certify the	at this report is l	based			
I, Gary B. Wagn registered in the No. 30440), here	state of Was by certify the performed in	at this report is l n December, 200	based 01			

BHI-EE-202 (09/98)

			BO	PREHOLE LOG		·	Page 1 of 10  Date: 07   10   01
Vell ID:	C 3 3 9	2	Well N	ame: <u>2</u> 99- <i>E</i> 33-339	Location: 5 €	שרהפר ס	+ 241- BX Tank
roject:	2401	RCRA			Reference Meas	uring Point:	Ground Surface
		mple		~	e Description		Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Di Moisture Content, Sorting, A Size, R	stribution, Soil Classificat Angularity, Mineralogy, M Reaction to HCI	tion, Color, ax Particle	Depth of Casing, Drii Method, Method of Dr Sampling Tool, Sam Size, Water Level
<i>。</i> —	<b>4</b> (B)	niA.		0'-10' Backfil	material.		Cable Tool. Driv
_		. 1 .			, , , , , , , , , , , , , , , , , , ,		barrel 7'2"/6 8
_			ک ک				Barrer 12 6 8
			440		i		
_		l	40			<del></del>	
_			00				
5 —	Anhive.	] ]	4				Grab Archive same
-	·  [	] }	Δ Δ 	6- 15' 5: 1ty San	dy Gravel (msg):	50°/o	DSD'. a. B LOCK
-					10 % silt. Sand		
_	.		9000	<b>!</b> `	gravel , poorly sor	•	
_			0.01	y ·	les. 30% Basalt	•	
10	Acosin	1	0_0.5	il •			
10	1 I	1	585	etz (other), Rxn +	O Hell 10 TRSI	, ,	
_	1		000	dry.	· · · · · · · · · · · · · · · · · · ·		@ no. a. 3 < g
-	1 1		550	?		<del></del>	
-	-		502				
-	-		1000				
15 -	Ambie	<b>d</b>	1030	15-1855; 1765 and 4	5 marel (056) 40%	aravel.	Grab Anchive Sam
_	-		6.00	15 10 sand 5 % 5		5-1A.	Q 15.0' & B < &
-	_		000				
_			060	mod. sorted, grave			
	A cani	4	0.0:0	3 .	bbles. 40% basa		L
-	-	1		atz (other) Slight	wa Acr. Color G	<del>-y~4)                                    </del>	<u> २ । १८ ५ ′                                   </u>
מב סב	- Bution	-		10 YR 5/1) gray			Grah Archive S
-	-		2	18.5'-20 5:17 leng	100 10 s: It) Enter	bedded	බ <u>2</u> 5.0′
-	-		O	gravel Color 101	R 4/3. Brown.	(Sample	
.	-			moist.) The ran H	· ·	,	
	_		+ = -		95° (o sand, 5° 1	المعدورة	
3.5-	- Archi	_		<del>;</del>		•	G., , , , , , -
	_ l	4	0.5		che, 80 10 basa		
'	_		0.4	ate Cother) 5-A. Co		rk gray	@ 25.0' or, B < di
1	-		7. 2	(dry) Samply mois	7. No rxn Hel		<del> </del>
'	-		3323	= 23'- 25' 511ty 50	and (ms) 35% sit	. 65 Insan	3
<u> </u>		$\perp \downarrow$		Sand +-uese 70	6 basalt, 3010 c	ther (at z)	285-29.0 no No
Report	ed By: ر	harlene	<u>Marti</u>	nez	Reviewed By: DC	Ukeke	S
Title:	Geolog	157			Title: Geologis		
Signati	⊓Le: С °	arcene"	lon	Date: Orlitalos	Signature: MCUke	had	Date: 8/7/0

			ВС	REH	OLE LO	3				of 10
Well ID:	८३३२३	<u> </u>	Weil Na	me: 299	-633-339		Location: 5 € C	orner of	, 741-B	X Tank Farm
Project:	0401	RCRA					Reference Measi	uring Point:	Ground	Surface
	Sar	nple			Sam	ple Desc	ription		(	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log		Content, Sorting		on, Soil Classificat ity, Mineralogy, M n to HCl		Method Sampl	of Casing, Drilling , Method of Driving ling Tool, Sampler e, Water Level
30 —	Archive	nia	35.05 2.05 2.05 2.05 2.05 2.05 2.05 2.05	عع دده	nz.), 5-R, pa	orly se	rted. 10 YRSI	Z grayist	Grab	Archive Sample
-	1	ļ. 	2000		Strong run	•			1	d. B < defeat.
_	1	1 1	10 % o	25'-	30 Sligh	<u> </u>	t gravelly sa	nd. 10"/0_	<u> </u>	
-			0° 0. 0 2/0-	5111; 1	5 % graves	75"10	sand vf-c	.s. <u>v.,</u>	33' G	ravel decreosed
_				•	•		gravel max:		1	amatically
35	Acchive	1		9-8-bb-	s, mad sorte	1 SK, 6	e % o qt.z (othe	n) 40°(0		Archive Sample
-	1	1 1	5-4	1			.gray).No r	in Hel	@35' <i>e</i>	1. 13 < detect.
-	1				Silt lens	-				
-	-	1 1	U	41 -	4 0	•	(SG) 10 % 5		<del> </del>	
-		] ]	0	វៀ	•		icl. sanduf-		<u> </u>	
40 -	-Archive	4	\(\cdot\) \(\cdot\)	.1	<b>'</b>		, S-R, mod. 31			Archive Sample
-	-	1 1	8000	31	•		tz(other) 45°/c	basalt.	छ तए	a, B <ddet.< td=""></ddet.<>
-	-		25.00		(yray) Ils.					
-	-		0.00	el .	- 4		20 10 5:10		<del>                                     </del>	
95 -		_	0+0	21	•		a s-R, uf-c			A 11
13 -	- Arch: w	~	5-0-0	ا ا	•		salo, 55°10 c	,		Mrchive sample
	_		0.5				ous, strong r		<u> चित्र</u>	M, 25 - BRENCH
	_	<b>\</b> \	20,03	:1		En En	1999 MI Grans		+	
	7		000	XII '			nining eviden		+	•
		_	3000	:P: /	٧ (		wn. Strong rx		-	
50-	A resid	තී	2000 2000				sravel (ms6)	15ee		Anchive Sample
	7		17 00000	· · ·	lption for				1	<u>لا, که دعاوی.</u>
			0.0	0: 50 °	Silty Sandy	Grave	.1(msq) 15% ravel. Sand uf	5:1t,	501	low risk.
-	-1 \	1 1	0.00 a.00	32 /	5and 35 3	65% 6	ravel. Sand uf	<u>- use</u>		itch to Air
1			9.0 0	a mod s	orted S-R, G	ravel		rted.		4 guilling Pit
65 -	Archive		0.0.0	o max	size sm cobb	hes 101		an 4cl		Archive Sample
	-			0: 55 - 51	biscurdy e	travel (	<u> </u>	ond 55%	<u> </u>	· · · · · · · · · · · · · · · · · · ·
1			0.0	grav	el., Sind: VC	se, sa	well surted, 5	57 basalt,		
	- 1	1 1		45.9	rz. Marvel:	SR, M	od surted, mox	Size YESE	<del>                                     </del>	<u> </u>
, D	<u>-  \</u>		13.33	iil peni	اله ۱۷۷۵ حصار	9			<u></u>	
	_	- harlen	n Mari	tinez_		-	wed By: DC	Ukeke 1	<u></u>	
Title:	0-0510	•		· · · · · -	Datas	Title:	GO 1915	bokes		Date: 8/7/01
Signa	iture: 🕜	<u> areans</u>	marti	meg -	Date: 8711816	Signa	rure: //C//	eyes-	•	Date. 2/1/01

			ВС	REHOLE LOG			Page _3 of 10
Well ID: (	C339.5		Well N	ame: 299-532-339	[	Location: SE corner of 2	
Project:	CYOL	Or pA		<u></u>		Reference Measuring Point	
		nple		Sample I	Descr	iption	Comments:
Depth (Ft.)	Type No.	Blows Recovery	Graphic Log	Group Name, Grain Size Distr Moisture Content, Sorting, An Size, Rea	gularil	ty, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
60-	Anha	~^		56-58 Sand (5) 9	10%	sand 10/ gravel (empl)	Grab Archive Sample
-	.   AR	.		Sond: 1007 VISE, 40			
_	.			50'-223' Sand (5):			
_	.	1		well sorted, SR, 1076			
_	_			weak own HCL		9.12 1.12	
	prine	-		WOLF PER CICL			Grab Archive Sample
65 —	PACCALO	1			·- <u>-</u>		865'
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-	-	1 1				<del></del>	
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10-	- Army	4					Grab Archive Sample
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	_						
	_						
75-	- Bachix						Grab Archive Sample
1 13	_	1 1					ລາຣ'
1 .	_						
	_					1 111 2 21 1	
	_	1 1		(90) - sand 10% vise	., <del>4</del> 0	1.05E 401. mer 101.50-00	
ļ	-  1		35.5			<del></del>	
80 -	- archi		N. A. A.	3			Grab Archive Sample
-	-	1				·	<u>  580′</u>
	-					<u> </u>	
	-	1 1		<u> </u>			- 12 to 12 t
1	- 1					· ·	
85-	- W	<u> </u>		Š			Grab Archive Sample
1	_						D 85'
Ì							
	<u> </u>	1 1	233	20			
Pos	—  ₩		115.71.	···	Review	wed By: DCUKEK	b7
	orted By:						
Title:	- DECT	2917+				Geologist,	Date: 0/2/0:
Signa	ature: /	منبلات		Date: 7/ (9 / 0)	Signa	ture: /XCUBERLES	Date: 8/7/01

	·			<del></del>	
		ВС	DREHOLE LOG		Page <u>4</u> of <u>10</u> Date: <u>7   19   0</u>
Well ID:	C 3392	Well N	ame: 299-E33 - 339	Location: SE Corney	of 241-By tankform
Project:	CYDI RCE			Reference Measuring Point	: 45
	Sample		Sample Des		Comments:
Depth (Ft.)	Type Blows No. Recove	1	Group Name, Grain Size Distribu Moisture Content, Sorting, Angul Size, Reacti	arity, Mineralogy, Max Particle	
90 —	Archive NA				Grab Archive Sample
-	AR				89p'
-					
<u> </u>			<u> </u>		
_			94' Sund (5) 10% (	8 40/ med 50/h-vfr	
95-	Archive			59 Wear run He	
` <u> </u>			20-30% baselt, 80-70% a		Q 95'
_					
	4 1 1	W 77.5			
_					
100-	- Archive		100' Sand (5) Sam	e as above	Grab AnhiveSompho
_	-				B 100 '
_	_				T
_	_				
_	_				
105	- Archive		165' Sand (5) san	as as abase	Erah Archine Somela
143	1310/196		3410 07 040	14 40 4 VIVA	D 105'
<u> </u>	_				- COS
_	_				
	_		<u> </u>		
1		33.56			C -1 2-21 - 52 212
110-	- Archive		No sand (s) same	as above	Grab Archive Sample
	_				@ 110'
'	_	4	<u></u>		
	_		:		<del></del>
				٥, ٥, ١	
115	- Annive		115' Sand (s) 10% 0	,	,
	-		• 1	brownish gray) 5-R	, by 115
	-		30% Basalt, 70%	otz (other) 200 rly	
	-		sorted, weak own !	101	
	<u>-  \                                   </u>		<u>:                                    </u>	10 10/1/2	
<u> </u>	ted By: CTric	<u> </u>		ewed By: DCURER	<u>లు</u>
Title:	Geologist		Title		1 104 0/2/0
Signat	ture: CAu	<u> </u>	Date: 1/19/01 Sign	ature: MC Affective	Date: 8/7/0/

		<u> </u>	В	DREHOLE	LOG			Page ≤ of <u>IP</u> Date: 7/19/01
Well ID:	C 33°	12_	Well N	ame: 294-E	33 - 32	59	Location: SE Comer	of 241-BX Tankfam
Project:		RCRA			<u> </u>		Reference Measuring Point:	· · · · · · · · · · · · · · · · · · ·
		mple			Samp	le Desc	ription	Comments:
Depth (Ft.)	Type Blows Log No. Recovery		Graphic Log	Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCI				Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
1550,—	Anhive	NA.		120' (sand)	5, v <del>¢</del>	- cs.e	, poorly sorted	Grab Archive Semple
-	AR	-					ish gray. S-R	ର ।20′
-				70°10 9+2(	other)	30%	basalt, poorly	
-				sorted, w			`	
-								
125 -	Archive	]		125' Sand	(5) 5	same	as above	Grab Archive Sample
_	1 1					· · · · · · · · · · · · · · · · · · ·		@ 125'
-	.					<del></del>		
-								
-								
130'-	Prohive	1	0	130' 7% 6	اططمهمه	e		Grab Archive Sample
-	-						,	@ 130'
-	-							
-	-		0				· .	
-	- ],							
1351—	Arimve	1						
-	-			135' Suns	- 201 40	cse 60	1% cse 70% for -vfu	Grab Archive Sample
-	-			morra ren	HCI.			0 135'
-	-		13.55	_			~8%.	<b>.</b>
-	- ],		· 0 : O.					
140'-	- Achiv	2	0;	140 Sand	رما زم	10 5	and f-vcse,	Grab Archive Sample
-	- 1	1	0	Poorla sent	ted, 30	-35°1	o basalt, 1.5-70%	9 140'
-	-			atz Cother	SA.	IOYR	5/2 (dry) sample	d. B & detect.
-	-						wa) no ran Hel	
] .	_			<u>;</u>	4 4 -			
145'-	Archiv	e l		: 45' San	d(s) =	Same	as above	Grab Archive Sample
	-	7						<b>७</b> । ५४′
	_			;				
	_							
L	↓	LV						
Report	ed By: 🐧	Trice	c. Ma	rtinez		Review	ved By: DCUkek	es
Title:	Geolos	<b>\</b>	beolog			Title:	Geologist,	
Signatu	~	i '\	E.Max	,	119/0	Signat		Date: 8/7/6/

Well ID: C 3393 Well Name: 299-633-339 Location: SE corner of 241-1287ant Form Project C401 RCRA Dr. Illing  Sample  Sample Sample Description  Comments  Co				ВС	REHOLE LOG			Page <u>6</u> of <u>10</u> Date: 07 20 01
Project: CAOI RERA Drilling  Sample Sample Description  Sample Comments:  Depth (Ft.) Type Blows Recovery  No. No. Recovery  No. No. Recovery	Well ID:	C 3 3 9	<del>ک</del>	Well N	ame: 299-633-339		Location: SE corner of	
Sample  Depth (Ft.) Type Blows No. Precovery  No. Recovery  No. No. Recovery  No. No. Recovery  No. No. Recovery							4	
Type Blows No. Recovery  Log Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCI  150—Barkins  AIR  30 AS 6 besolt, 65-70 6 qtz(other) 5A 9 150  155— 107 Sand (5) 100 % 4- vese, peorly sorted.  30 AS 6 besolt, 65-70 6 qtz(other) 5A 9 150  155— 107 Straine  100 Fran HCI.  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) See description (6) 150  Grab Archive Sample  100 Sand (5) Sand (5) Same as above.  100 Grab Archive Sample  100 Sand (5) Same as above.  100 Grab Archive Sample  100 Sand (5) Same as above.  100 Grab Archive Sample  100 Sand (5) Same as above.  100 Grab Archive Sample				4	Sampl	e Desc		
150 - Accepted 150 Sand (5) 100 to 4-vese poorly sorted. Grab Archive Sample 30-35 to basalt, 65-70 to get (other) 5A			Recovery		Moisture Content, Sorting, Angularity, Mineralogy, Max Particle		Method, Method of Driving Sampling Tool, Sampler	
30-35 (6 basalt, 65-70 (6 gtz (other) SA 9) 150  155 - 107R 5/2 (dry) sample moist (gray ish brown)  155 - 100 mad. 15/0 free gtz (gray ish brown)  155 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish brown)  160 - 100 mad. 15/0 free gtz (gray ish gray gtz)  160 - 100 mad. 15/0 free gtz (gray ish gray gtz)  160 - 100 mad. 15/0 free gtz (gray ish gray gtz)  160 - 100 mad. 15/0 free gtz (gray ish gray gtz)  160 - 100 mad. 15/0 free gtz (gray ish gtz)  160 - 100 mad. 15/0 free gtz (gray ish gtz)  160 - 100 mad. 15/0 free gtz (gray ish gtz)  160 - 100 mad. 15/0 free	150-		nia I		_	_	,	1
155 - Inchive Strive Sample moist (gray ish brown)  160 - Archive Sample 160 same as above.  160 - Sand (s) same as above.  160 - Sand (s) see description (a) (20).  160 - Sand (s) see description (	-	HIL	<u> </u>					@ 12D_\
165 - Dochward 155' sand (s) same as above.  160 - Archive Sample  165' sand (s) see description (2015) Grab Archive Sample  165' sand (s) see description (2015) Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample	-	1						
165 - Dochward 155' sand (s) same as above.  160 - Archive Sample  165' sand (s) see description (2015) Grab Archive Sample  165' sand (s) see description (2015) Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample  165' sand (s) 100'/0 f-vcse, SA, 30'/0 Grab Archive Sample	-				10YR 5/2 (dry) sam	pte m	oist (grayish brown)	·
160 - Archive Sample  160 - Archive Sample  160 - Sand (s) see description (a) 150'. Grab Archive Sample  165' sand (s) see description (a) 150'. Grab Archive Sample  165' sand (s) 100's f-vcse, SA, 30's Grab Archive Sample  165' sand (s) 100's f-vcse, SA, 30's Grab Archive Sample  165' sand (s) 100's felsic, poerly sorted, 1048512 a) 165'  170 - Archive  170' sand (s) same as above Grab Archive Sample	155 -				· · · · · · · · · · · · · · · · · · ·			
160 - Archive  160' sand (s) see description (20) Grab Archive Sample  (20) Sand (s) see description (20) Grab Archive Sample  (20) Sand (s) 100's f-vcse, SA, 30's Grab Archive Sample  (21) basalt, 70's felaic, 200 rly sorted, 1048512 20 165'  (21) grayish brown, Sample moist, 100  TXN HC1.  170' sand (s) same as above Grab Archive Sample		Juma	‡			····		Grab Archive Sample
165' sand (s) 100% f-vcse, SA, 30% Grave Archive Sample  hasalt, 70% felsic, poorly sorted, 1048512 20165'  (Ary) grayish brown, sample maist, no  rxn Hcl.  170 farmire  170' sand (s) same as above forab Archive Sample	-	-			155' sand (s) sam	ne 05	above.	२ ८८८ <sup>८</sup>
165' sand (s) 100% f-vcse, SA, 30% Grave Archive Sample  hasalt, 70% felsic, poorly sorted, 1048512 20165'  (Ary) grayish brown, sample maist, no  rxn Hcl.  170 farmire  170' sand (s) same as above forab Archive Sample	-	-						
165' sand (s) 100% f-vcse, SA, 30% Grave Archive Sample  hasalt, 70% felsic, poorly sorted, 1048512 20165'  (Ary) grayish brown, sample maist, no  rxn Hcl.  170 farmire  170' sand (s) same as above forab Archive Sample	-	-						
165' sand (s) 100% f-vcse, SA, 30% Grave Archive Sample  hasalt, 70% felsic, poorly sorted, 1048512 20165'  (Ary) grayish brown, sample maist, no  rxn Hcl.  170 farmire  170' sand (s) same as above forab Archive Sample	-	-						
165 sand (s) 100% f-vcse, sA, 30% Grab Archive Sample  hasalt, 70% felsic, poerly sorted, 1048512 @ 165  (Ary) grayish brown, sample moist, no  rxn Hcl.  170 sand (s) same as above frab Archive Sample	160-	Acchive	1		160' sand (5) see	. des	scription@190'	Grab Archive Sample
hasatt, 70% felsic, poerly sorted, 1048512 @ 165'  (Ary) grayish brown, sample moist, no  rxn HCl.  170 familie  170 sand (s) same as above frab farhive sample	-	-						@ 160'
hasatt, 70% felsic, poerly sorted, 1048512 @ 165'  (Ary) grayish brown, sample moist, no  rxn HCl.  170 familie  170 sand (s) same as above frab farhive sample	-	-						
hasatt, 70% felsic, poerly sorted, 1048512 @ 165'  (Ary) grayish brown, sample moist, no  rxn HCl.  170 familie  170 sand (s) same as above frab farhive sample	-	-				-		
hasatt, 70% felsic, poerly sorted, 1048512 @ 165'  (Ary) grayish brown, sample moist, no  rxn HCl.  170 familie  170 sand (s) same as above frab farhive sample	-	-						
170 - Archive 170' sand (s) same as above frab Archive Sample	46-	- Acchive	1		165' sand (5) 10	o°%	f-vcse, SA, 30%	Grab Archive Sample
170 - Archive 170' sand (s) same as above frab Archive Sample	-	-			basatt, 70% fels	مند. ج	poorly sorted, 1048512	@ 165'
170 - Arabive 170' sand (s) same as above from Archive Sample	.	-			•1		•	
170 - Brasive 170' sand (s) same as above frob earlier sample	.	-					,	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.	-  , _						
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-סרי	- Archiv			170' sand (5) s	ane	as above.	Grab Anchive Sample
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		_						
		_			<u> </u>			
		_						
175 sand (s) same description. no Grab Archive Sample	175-	- Acchive	_		175' sand (s) so	2md	description. no	Grab Archive Sample.
- 1   mn HCL. (2015)	"	- ì	7		i.			1
		_						
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Reported By: Charlens Martinez Reviewed By: D Cukekes	Repor	ted By: c	harun	e Mar	tine Z	Revie	wed By: DCUKEKES	
Title: Geologist Title: Geologist						Title:		
Signature: Charles Martine Date: 07/20/01 Signature: Mc Weekes Date: 8/7/01				nathe	Date: مرا عماره 1	Signal	ture: SE Ukehaa	Date: 8/7/01

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			ВС	REHOLE LO	)G			•		וסוסבודים
Well ID:	C 3392		Well N	ame: 299-633-33	9	Į	ocation	:SE corner of		
Project:	C401 :	rcea c				ı	Referen	ce Measuring Point	Groun	d.Surface
_		mple	4	Si	ample	e Descri				Comments:
Depth (Ft.)	Type No.	Blows Recovery	Moisture Content, Sort	ame, Grain Size Distribution, Soil Classification, Color, Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl			Metho Sam	h of Casing, Drilling d, Method of Driving pling Tool, Sampler ize, Water Level		
ಭo	Anchive	NIA	3.3						Grab	archive sample
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	.								Emb	archive Sample
185	Archive								1	85'
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190-	- Archive	4						* Ash	coca h	Anchine Sampt
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_	_		0.0	95 6 sand, 5%				•		
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195-	- Brenium	_					•		C	Archive Sumple
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<del>2</del> 225 −	- Avchy	4		]						Archie Sumple
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Report	<u>니                                    </u>	7c	200.100	<u> </u>		Review	ad Bv:	DC Weckes	<u> </u>	
Title:					-+	<del></del>		agist		
Signat	<u>(&amp; ca) /</u> :ure: /	24174		Date: 7123	-	Signatu		K. dipo has		Date: 8/7/0/
-igilat	<u> </u>	JUL LE		1-200 1123	ارم	1 - 5		July		<del></del>

Well ID: C3397  Well Name: 297-123-339  Location: St. cercer of 241.8x Text Server  Reference Measuring Point: G  Sample  Sample Description  Type Blows No. Recovery		. =		В	OREHOLE LOG	i -		Page <u>8</u> of <u>10</u>
Project: CYO1 RCQA Dr. II. M. Sample Sample Depth Type Blows Recovery Corona Sample Companies:  Type Blows Recovery Sample Log Graphic Log Group Name, Grain Size Distribution, Soil Classification, Color, Molisture Content, Sorting, Angularity, Mineralogy, Max Particle Sampling Tool, Sampler Size, Reaction to HCl Street, Max Particle Sampling Tool, Sampler Size, Water Level Sample C. 210  210 Archive Corona Archive Sample C. 210  210 Archive Sample C. 210  2119 Street St	Well ID:	( 3392		Well N	ame: 209 #2# 3.50		ocation:	0 11 EDIO 1
Sample   Sample   Sample   Description   Comments:    Depth   Type   Blows   No.   Blows   Recovery   Graphic   Log   Graphic   Log   Graphic   Log   Graphic   Log   Graphic   Size, Distribution, Soil Classification, Color, Molsture Content, Sorting, Angularity, Mineralogy, Max Particle   Sampling Tool, Sampler   Size, Reaction to HCl   Size, Reaction to HCl   Graph Archive Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Sample   Graph Archive   Graph Ar		_	0004		·			
Depth of Casing, Drilling  Blows Recovery  No. Recovery  N				1)111(	1		·	
215 Archive Simple  (C 210)  210  210  211  211  211  211  211		t.) Type Blows No. Recovery		,	Group Name, Grain Size D Moisture Content, Sorting,	_ istributior Angularit	n, Soil Classification, Color, y, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler
210 Archive Grab Archive sample 2 215'  219' 5/ 15/ mpd pr holog;  221' 22' - 15/ see, 20/ med, 40/fm, Grah Archive Sample  10% vth, 15/91t, Samel (95)  223' 5/ 10/2000 in growell 20/ med  probles Trace sitt 10/87/2 (It gray)  Leak Archive Sample  230' Sand flowel 10/ cse probles, 20/ med  240' Sand flowel 10/ cse probles, 20/ med  250 225' 5/ 20/ fa-ufn probles, 20/ med  250 Archive Sample  260 Archive Sample  260 Archive Sample  270 Archive	210-	ACCTIVE	NA.					Garly Archive Sample
215 Archive Grab archive simple  229 - 5/ 15/ mad pholos;  221 - 221 - 10/ cse, 20/ med, 40/ for, Grab Archive Sample  10 / vh. 5/ 514 (sand)  2220 - 2220  223 - 223 - 10/ crease in grave 1 20/ pred  probles Trace in grave 1 20/ pred  probles Trace in grave 1 20/ pred  probles Trace in grave 2 20/ pred  225 - 28/ mad finance in love 1/2 (14 gray)  10 / sund finance in love 1/2 (14 gray)  226 - 226 - 28/ mad finance 20/ med  227 - 28/ mad finance 20/ med  227 - 28/ mad finance 20/ med  230 / sund finance in love 20/ med  230 / sund finance 20/ med  230 / su	_	A. A.			"			
219 - 5/ 15/ mpd phblos.  221 - 221 - 10/ cse, 20/ med, 40/ m, Grab Arrhue Sample  20 - 10/ vh, 15/ sit. (sand)  223 - 15/ sounds (gs)  225 - 25/ sounds (gs)  226 - 25/ sounds (gs)  227 - 225/ sounds (gs)  228 - 25/ sounds (gs)  229 - 225/ sounds (gs)  220 - 225/ sounds (gs)  226/ sounds (gs)  227/	_						•	
219 - 5/ 15/ mpd phblos.  221 - 221 - 10/ cse, 20/ med, 40/ m, Grab Arrhue Sample  20 - 10/ vh, 15/ sit. (sand)  223 - 15/ sounds (gs)  225 - 25/ sounds (gs)  226 - 25/ sounds (gs)  227 - 225/ sounds (gs)  228 - 25/ sounds (gs)  229 - 225/ sounds (gs)  220 - 225/ sounds (gs)  226/ sounds (gs)  227/	_	1 1					W. 5.	
219 - 5/ 15/ mpd phblos.  221 - 221 - 10/ cse, 20/ med, 40/ m, Grab Arrhue Sample  20 - 10/ vh, 15/ sit. (sand)  223 - 15/ sounds (gs)  225 - 25/ sounds (gs)  226 - 25/ sounds (gs)  227 - 225/ sounds (gs)  228 - 25/ sounds (gs)  229 - 225/ sounds (gs)  220 - 225/ sounds (gs)  226/ sounds (gs)  227/	_							
219 ' 5/ 15/ mpd phblos;  221 - 222 - 6/ cse, 20/ med , 40/ fm, Greb Arrive Sample  10% vhn, 15% sith Samed (95)  223 = 5/ (crease in grave) 20/ med  Pubbles i Trace sith 104 = 7/2 (14 gray)  225 - 225   225   235 (and fiRAlIT (5G) - 40), gravel (225)  225   225   235 (and firevel - 10) ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ ase ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles, 20/ med  230 / sund firevel - 10/ see ptbles	బ5—	Archive						Grab archive sample
221-221 - 101 cse, 201 med, 40/fn, Grab Arrhive Sample  10% vh. 15% sit. (sand)  2220'  273 = 15 gravely Sand (gs)  275 = 15 gravely Sand (gs)  276 = 15 gravely Sand (gs)  277 = 15 gravely Sand (gs)	-	-						e 215'
221-221- 10/cse, 20/med, 40/m, Grab Archive Sample  10% vh, 15% sit. (sand)  2220'  273 = 15 gravely Sand (gs)  275 = 15 gravely Sand (gs)  276 = 15 gravely Sand (gs)  277 = 15 gravely Sand (gs)  278 = 15 gravely Sand (gs)  27		.						1 .
221-221- 10/cse, 20/med, 40/m, Grab Archive Sample  10% vh, 15% sit. (sand)  2220'  273 = 15 gravely Sand (gs)  275 = 15 gravely Sand (gs)  276 = 15 gravely Sand (gs)  277 = 15 gravely Sand (gs)  278 = 15 gravely Sand (gs)  27	] -	-	ļ. ļ		<u> </u>			
221-221- 10/cse, 20/med, 40/m, Grab Archive Sample  10% vh, 15% sit. (sand)  2220'  273 = 15 gravely Sand (gs)  275 = 15 gravely Sand (gs)  276 = 15 gravely Sand (gs)  277 = 15 gravely Sand (gs)  278 = 15 gravely Sand (gs)  27	-	$\downarrow$			219 - 5/ 15/ mg	d rebb	los.	
10% VAn, 15% SIH, Cand)  2220  223 25   Grand Sand (95)  223 25   Octros In grave   ~20% med  225   Phobles, Trace sith 1048 7/2 (14 gray)  226   Phobles, Trace sith 1048 7/2 (14 gray)  227   Phobles, Trace sith 1048 7/2 (14 gray)  228   Phobles, Trace sith 1048 7/2 (14 gray)  228   Phobles, Trace sith 1048 7/2 (14 gray)  229   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  227   Phobles, Trace sith 1048 7/2 (14 gray)  228   Phobles, Trace sith 1048 7/2 (14 gray)  229   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  227   Phobles, Trace sith 1048 7/2 (14 gray)  228   Phobles, Trace sith 1048 7/2 (14 gray)  229   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  227   Phobles, Trace sith 1048 7/2 (14 gray)  228   Phobles, Trace sith 1048 7/2 (14 gray)  229   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  227   Phobles, Trace sith 1048 7/2 (14 gray)  228   Phobles, Trace sith 1048 7/2 (14 gray)  229   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  220   Phobles, Trace sith 1048 7/2 (14 gray)  227   Phobles 1048 7/2 (14 gray)  228   Phobles 1048 7/2 (14 gray)  229   Phobles 1048 7/2 (14 gray)  220   Phobles 1048 7/2 (	220-	Arthur	1		221' - 222' - 101/ cs	e, 20%	med, 40%fo.	Grab Archive Sames
232 1 gravelly Sand (95)  273225 (Octrosise in gravel ~ 201/ med  pubbles, Trace sith 1048 7/2 (14 gray)  225 225 235 (10 gravel (10 gravel) (10 gravel)  225 225 235 (10 gravel)  225 235 235 (10 gravel)  225 235 235 (10 gravel)  225 235 235 (10 gravel)  225 225 (10 gravel)  226 (10 gravel)  227 (10 gravel)	-	-	1 1	100	20% vh , 50% S	ilt. Ga	nd)	
Phobles, Trace sitt 1048 7/2 (1t gray)  Leak M HC1.  Dio 225 235 235 230 24 GRAHT 15(G) - 70% gravel @ 225 1  Dio 20 20 / Sundy GRAHT 15(G) - 70% gravel @ 225 1  Dio 20 20 / Sund Gravel - 10% cse petoks, 20% med  Dio 20 20 / Sund Gravel - 10% cse petoks, 20% med  Dio 20 20 / Sund Gravel - 10% cse petoks, 20% med  SR-SA Sund - 30% vcse, 20% cse, 20% med  Dio 20 30 / fn-vfn. SR 80% bosolt, 20% gtz.  Grab Archive Sungle  Color 10487/2 (dry-ltagray); dry; bleak mx HCl @ 230%  Color 10487/2 (dry-ltagray); dry; bleak mx HCl @ 230%  Commel - 70% Ane peto, 10% pessed 20% sall  Commel - 70% Ane peto, 10% pessed 20% sall  Dio 30 30 42 1048 7/2 (wet - gray, sh. orn Arcus sitt Grab Archive Sungle  235 - 25 slightly silty Sandy GRAM - msg. @ 235'	-	-			. *	_		
Phobles, Trace sitt 1048 7/2 (1t gray)  Leak M HC1.  Dio 225 235 235 230 24 GRAHT 15(G) - 70% gravel @ 225 1  Dio 20 20 / Sundy GRAHT 15(G) - 70% gravel @ 225 1  Dio 20 20 / Sund Gravel - 10% cse petoks, 20% med  Dio 20 20 / Sund Gravel - 10% cse petoks, 20% med  Dio 20 20 / Sund Gravel - 10% cse petoks, 20% med  SR-SA Sund - 30% vcse, 20% cse, 20% med  Dio 20 30 / fn-vfn. SR 80% bosolt, 20% gtz.  Grab Archive Sungle  Color 10487/2 (dry-ltagray); dry; bleak mx HCl @ 230%  Color 10487/2 (dry-ltagray); dry; bleak mx HCl @ 230%  Commel - 70% Ane peto, 10% pessed 20% sall  Commel - 70% Ane peto, 10% pessed 20% sall  Dio 30 30 42 1048 7/2 (wet - gray, sh. orn Arcus sitt Grab Archive Sungle  235 - 25 slightly silty Sandy GRAM - msg. @ 235'		-		0 0 4	223 =25 increase in	nd (95	el ~201/ med	
Traine Week re HCI.  1000 225 255 200 and GRANEL (SG) - 70% gravel (225)  225 255 200 and Grovel - 10% cse petbers, 20% med  225 255 200 and Grovel - 10% cse petbers, 20% med  225 256 257 5R - 4 and - 30% vcse, 20% cse, 20% med  230 - Archive Sangle  230 - Archive Sangle Color 10407% (dry-Hagray); dry; weak rx HCl (2 230%  230 - Sondy GRANEL (SG) 90% gravel 20% saxx  Commel - 70% Ane pet , 10% pessent 20% saxx  235 - Archive Sangle Sondy GRANEL - 70% for SA, 20% for Archive Sangle  235 - Archive Sondy Gravel 20% saxx  235 - Archive Sondy Gravel 30% saxx  235 - Archive Sondy Gravel 30% saxx  235 - Archive Sondy Gravel - 30% for Archive Sangle  235 - 28 slightly silty Sandy GRANEL - msg (2 235)	_	-  ↓		ف منه	P1			
230 - Archive 20% of Sund Figure 10% cse petbles, 20% ored  - Vision pebbles, 70% fratto reboties, poorty worked  SR-SA a Sand - 30% vose, 70% cse, 70% med,  SR-SA a Sand - 30% vose, 70% cse, 70% med,  SR-SA a Sand - 30% vose, 70% cse, 70% med,  SR-SA a Sand - 30% vose, 70% cse, 70% med,  Grab Archive Sungle  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-lt	225	- Archive	†	:0-0 0	weak ox HCI.			Frob Atchive Simple
230 - Archive 20% of Sund Figure 10% cse petbles, 20% ored  - Vision pebbles, 70% fratto reboties, poorty worked  SR-SA a Sand - 30% vose, 70% cse, 70% med,  SR-SA a Sand - 30% vose, 70% cse, 70% med,  SR-SA a Sand - 30% vose, 70% cse, 70% med,  SR-SA a Sand - 30% vose, 70% cse, 70% med,  Grab Archive Sungle  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-ltagray); dry; weak xx HCl @ 230%  Color 1048% (dry-lt	-	-		0.00	225' 235' Sandy GRA	JEL (	sG)-70% gravel	@ 225 <sup>1</sup>
- Archive 235 - Sand Box vese, 20 vese, 20% sand CRAVA - msg Q 235'	-	-	ļ	00000				
230— Archive SR-SA, Sand - 30% vose, 20% ose, 20% med, 30% fn-vfn. SR, 80% hasalt, 20% at 2. Grap Archive Surges Color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; weak rx HCl. @ 230% color 1040% (dry-ltagray); dry; dry; dry; dry; dry; dry; dry; dry	-	-	1		72			
235— Archive 235 - 25 slightly silty sandy GRAVA - msg Q235'	-	-		000				,
- Color 10487/2 (dry-Itagray); dry; Weaker HCl Q 230!  - 230'- sond, GRAVEL [56] 50% gravel 20% sons  - 20% framel - 70% Ane pet, 10% x550-c5, 20% fra.  - 000 Sand 80% vcsc, 20 vfr-fra. 5A, exol has 11  235 - Archive - 235 - 20% slightly silty sandy GRAVA - msg Q 235'	230-	Archive	-	0.0				Grap Archive Sange
235 - Archive 235 - 25 slightly silty sandy GRAVA - msg (2235)	-	- 1	]	000				
235 - Archive - 70% Ane peb, 10% pese 5, 20% ffr.  235 - Archive - 70% Ane peb, 10% pese 5, 20% ffr.  235 - Archive - 20% oftz. 10 VA 5/2 (unt - gray, sh. Dr. Archive Sample - 235 235 - 25 slightly silty sandy GRAVA - msg. Q 235'	-	-		1.0 / h. V.	-1 .7	-	7 3	
- DO Sand BO! vess, 20 vfn-fn. SA, 80! hes. 14  235-Archive - DOT: 972. INVA 5/2 (wet - gray, sh Den Archive Sample - 235' 235'-26's lightly silty sandy GRAVA - msg Q 235'	· -	-	1	30%		Deb. 16	1. rese & 20% mm.	
- Case 20 235 25 slightly silty sondy GRAVA - msg (225'	-	-		000	Sond BOY Vese.	20 Hr.	for SA , 80% besalt	
1 000	235-	Archive	<u> </u>		20% atz. 1048 5/21	(wet-o	rayish orn Arausit	+ Grab Archive Surrele
- 1 20 0 1 20 1 C/ 214 MAANA	.	- I	[	93.2	235-25 slightly si	Itu sar	un GRAVAL-msa	Q 235'
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		_		000	75% Grave 1, 20% Sa	nd . 5%	Silt GRAVER: MOSTIN	·
- Down and apples St. pourly socked sand: Boy fre No cutting strem		_		000	sined achies. Sk. a	purh soc	kd. Sund: 80% fre	- No cutting stem
20 -fn. LOVR 1/2 Ltt braish gray). 80/ breat Shart exait 299' -7 239.5'	٠.	-   $\downarrow$		Y.0.1.	120 - fn. LOVR "12 LH be	rnish ara	V). 80/ broat. Slytt rxn H	239'-7 239.5'
Reported By: 1. Trice Reviewed By: DCUkekes	Report	ed By: (	. Trica				7017	\$
Title: Geologist, Title: Geologist,	Title:	Genl	03.41			Title:	Geologist,	
Signature: Date: 07  24   01 Signature: MC Worker Date: 8/7/61	Signati		المالية	,	Date: 07 124 / 01	Signatur	: De Weekes	Date: 8/7/01

			D.C	REHOLE LOG		Page <u>4</u> of <u>LO</u>
			D	TRENULE LUG	<u> </u>	Date: 7/24/01
Well ID:	<u> </u>	92_	Well N	ame: 299-E33-339	Location: & corner of	241-BY Tankfarm
Project:	CYOL	QCOA.	Dallin	Υ	Reference Measuring Point:	6S
-	Sar	mple		Sample Des	cription	Comments:
Depth (Ft.)	Type Blows Log Recovery			Group Name, Grain Size Distribut Moisture Content, Sorting, Angula Size, Reaction	arity, Mineralogy, Max Particle	Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
<i>9</i> 40 —	Archive	АН	0.00	286 - gravel increase to predo	on vicse pubbles, SR, 80%	Grab Archive Sample D
_	ALTRODAY	.	000	gravel, 20% sund		240.
_		1 1	8000	240' - gravel 80% (se, 20% m	alafa chailte inve 3/2	
			00000	· ·		
-			22.04	(It gray), SA-SR, L	Jeak (ND HC)	
-	1	] [	0.000	<u> </u>		c i c i a puri
544 —	- Acchive	}	600			Book Archive Sample 245
-	1 1		0000		, , , , , , , , , , , , , , , , , , ,	
1 -	-	1	300		<u> </u>	
-	-	1	88			
-	-	1	280°			
250-	Achive	1	2200	250'-252' - Gravel	(61)	Fresh Arrhave Saple@ 250
-	- 1			80% cse, 10% vcsa, 10% med-	fn. SR, IOYR 1/2(It.	
	- Arthive	4	<b>80888</b>	braish gray), trace sult,	=	Grob Archive Sample a 252
	_ 1.	7	=====	2521-253.51 - SILT L		
.	- Archive	-{	37 - O. A.S.	interhedded	grovel, 104R 5/2 (brn), wk HU	Grab Archive Sample 254
252	T.V	7		253.5 - 254' - d.silty	sandy (Dravel (msh)	From Archive Sample 9 255
255	- Archive	†			20% Sand, 5-10% silt.	
	_\	1 1		KI		
'	_			٠ '	dy sorted. Gravel: SR,	
'	-	1 1		med sorted, max size		
1	-  ↓			3541-2601 - Firay	=	
260-	- Archive	7	9,000	4.4	Gravel: see 2501. Shord	Grab Archur Sample 260'
1	-	1 1	900	cse, 5A, 80% hasalt, 20% c	·	13011+ spoon 260'-262'
	-			260-275 - Sandy	Gravel (SG)	
	-1		000	6 60% gravel, 40% sund, t	rsilt. Gravel: 10%.sm.	
1	- 1 1	1 1	1000 200	3. coppies, 10%, vcse peb., 10%	. Ge peb. , 35% med peb, 35.	4
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<del></del>			BC	OREHOLE LOG		Page <u>iO</u> of <u>iO</u>
Mall ID.					Location: C	Date: 01/25/01
	<u>C339</u>			ame: <del>291-<u>E33-339</u></del>	Reference Measuring Point	
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(Ft.)	Type No.	Blows Recovery	Log	Group Name, Grain Size Distribut Moisture Content, Sorting, Angula Size, Reaction	rity, Mineralogy, Max Particle	Method, Method of Driving Sampling Tool, Sampler Size, Water Level
ġ7o	Aroniva	NAS	Oaba	: .		Gab Aehive Sx
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# Appendix B

**Physical Properties Data** 

## Appendix B

## **Physical Properties Data**

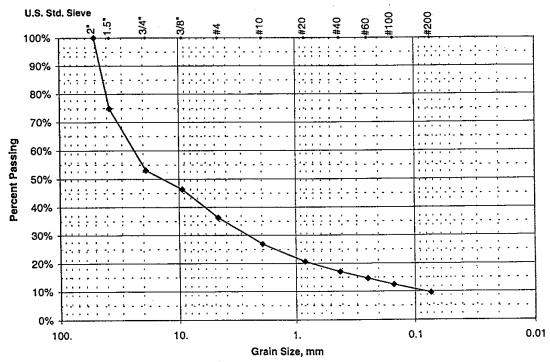
This appendix includes the results of testing for particle size distribution on split spoon samples from the wells 299-E33-337, 299-E33-338, and 299-E33-339. The analyses were done by CH2M HILL Hanford, Inc. using standard sieve techniques.

### SIEVE ANALYSIS

WELL NAME	299-E33-337	DEPTH	259.9'-260.9'	SAMPLE#	E33-337-259.9	WELL ID#	C3390
TESTED BY	J.M.Wimett	CONTACT	Dave Weekes	PHONE	372-9130	DATE	08/23/2001

SAMPLE	SIEVE	CUMULATIVE	% WEIGHT	%	Grain Size	COMMENTS
WT (g)	SIZE IN.	WE!GHT(g)	RETAINED	PASSING	(mm)	
843.30	2"	0.0	0.0	100.0	50.80	
	1.5*	211.8	25.1	74.9	38.10	
Ì	3/4"	395.5	46.9	53.1	19.05	
	3/8"	451.9	53.6	46.4	9.42	
į	#4	537.1	63.7	36.3	4.70	
	#10	616.4	73.1	26.9	1.98	
	#20	669.1	79.3	20.7	0.83	
	#40	699.9	83.0	17.0	0.42	
1	#60	719.9	85.4	14.6	0.25	
	#100	738.5	87.6	12.4	0.150	
	#200	762.6	90.4	9.6	0.074	

### Sieve Analysis Data for Sample E33-337-259.9



Comments: Sandy Gravel

All data are accurately and completely recorded.

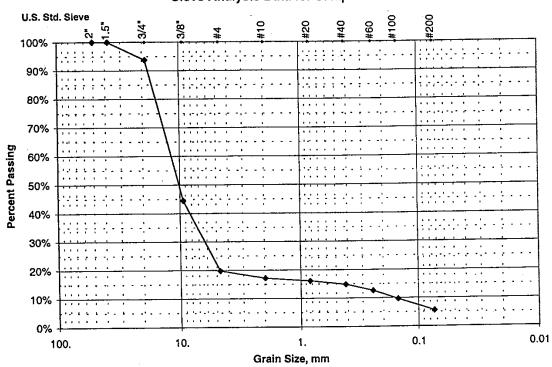
Checked By: / Makales Deweles Date: /0/16/0/

### SIEVE ANALYSIS

WELL NAME	299-E33-337	DEPTH	260.9'-261.9'	SAMPLE#	E33-337-260.	9WELL ID#	C3390
TESTED BY	J.M.Wimett	CONTACT	Dave Weekes	PHONE	372-9130	DATE	08/23/2001

SAMPLE	SIEVE	CUMULATIVE	% WEIGHT	%	Grain Size	COMMENTS
WT (g)	SIZE IN.	WEIGHT(g)	RETAINED	PASSING	(mm)	
796.20	2"	0.0	0.0	100.0	50.80	
	1.5"	0.0	0.0	100.0	38.10	·
Ì	3/4"	49.2	6.2	93.8	19.05	
	3/8"	442.0	55.5	44.5	9.42	
1	#4	638.9	80.2	19.8	4.70	
	#10	659.7	82.9	17.1	1.98	
Î	#20	667.8	83.9	16.1	0.83	
	. #40	678.0	.85.2	14.8	0.42	
	#60	695.8	87.4	12.6	0.25	
	#100	719.7	90.4	9.6	0.150	
	#200	751.9	94.4	5.6	0.074	

### Sieve Analysis Data for Sample E33-337-260.9



Comments: Sandy Gravel

All data are accurately and completely recorded.

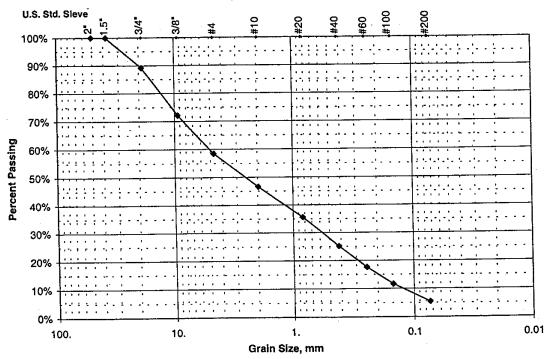
Checked By: // Julie Les Date: 10/16/01

### SIEVE ANALYSIS

WELL NAME	299-E33-338	DEPTH	259.3'-261.3'	SAMPLE#	E33-338-259.3	WELL ID#	C3391
TESTED BY	J.M.Wimett	CONTACT	Dave Weekes	PHONE	372-9130	DATE	08/23/2001

SAMPLE	SIEVE	CUMULATIVE	% WEIGHT	%	Grain Size	COMMENTS
WT (g)	SIZE IN.	WEIGHT(g)	RETAINED	PASSING	(mm)	
687.40	2"	0.0	0.0	100.0	50.80	
	1.5*	0.0	0.0	100.0	38.10	
	3/4"	74.3	10.8	89.2	19.05	
1	3/8"	191.8	27.9	72.1	9.42	
	#4	285.4	41.5	58.5	4.70	
ľ	#10	367.1	53.4	46.6	1.98	
Ì	#20	442.6	64.4	35.6	0.83	
	#40	514.4	74.8	25.2	0.42	
	#60	566.1	82.4	17.6	0.25	
	#100	607.3	88.3	11.7	0.150	
	#200	649.8	94.5	5.5	0.074	

### Sieve Analysis Data for Sample E33-338-259.3



Comments: Sandy Gravel

All data are accurately and completely recarded.

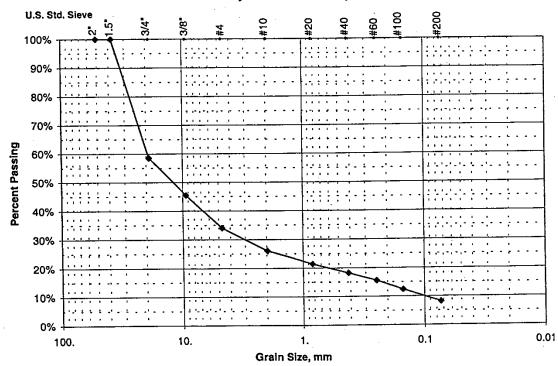
Checked By: DCUKPES (SCAPURAL Date: 10/16/01

#### SIEVE ANALYSIS

WELL NAME	299-E33-339	DEPTH	260.0'-261.0'	SAMPLE#	E33-339-260.0	WELL ID#	C3392
TESTED BY	J.M.Wimett	CONTACT	Dave Weekes	PHONE	372-9130	DATE	08/23/2001

SAMPLE	SIEVE	CUMULATIVE	% WEIGHT	%	Grain Size	COMMENTS
WT (g)	SIZE IN.	WEIGHT(g)	RETAINED	PASSING	(mm)	
761.50	2*	0.0	0.0	100.0	50.80	
	1.5"	0.0	0.0	100.0	38.10	
	3/4*	315.8	41.5	58.5	19.05	. •
	3/8"	415.7	54.6	45.4	9.42	
	#4	502.5	66.0	34.0	4.70	
	#10	562.6	73.9	26.1	1.98	
	#20	598.3	78.6	21.4	0.83	`
	#40	622.4	81.7	18.3	0.42	
	#60	643.1	84.5	15.5	0.25	
	#100	666.8	87.6	12.4	0.150	
	#200	699.1	91.8	8.2	0.074	

### Sieve Analysis Data for Sample E33-339-260.0



Comments: Sandy Gravel

All data are accurately and completely recorded.

Checked By: DC Weekes / Makillar Date: /0/16/0/

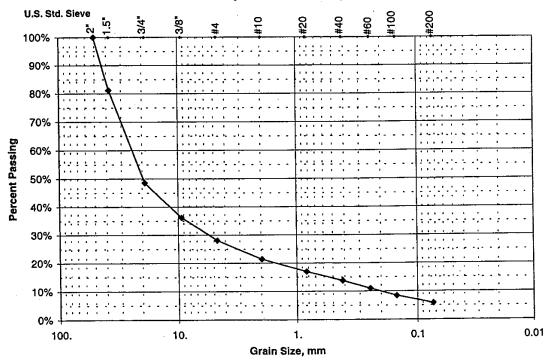
### CH2M Hill Hanford, Inc.

#### SIEVE ANALYSIS

WELL NAME	299-E33-339	DEPTH	261.0'-262.0'	SAMPLE#	E33-339-261.0	WELL ID#	C3392
TESTED BY	J.M.Wimett	CONTACT	Dave Weekes	PHONE	372-9130	DATE	08/23/2001

SAMPLE	SIEVE	CUMULATIVE	% WEIGHT	%	Grain Size	COMMENTS
WT (g)	SIZE IN.	WEIGHT(g)	RETAINED	PASSING	(mm)	
750.00	2"	0.0	0.0	100.0	50.80	
	1.5	141.0	18.8	81.2	38.10	·
Ţ	3/4"	385.7	51.4	48.6	19.05	
	3/8"	478.6	63.8	36.2	9.42	
	#4	539.2	71.9	28.1	4.70	
	#10	589.2	78.6	21.4	1.98	
	#20	622.6	83.0	17.0	0.83	
	#40	647.1	86.3	13.7	0.42	
	#60	667.8	89.0	11.0	0.25	
·	#100	686.9	91.6	8.4	0.150	
	#200	706.6	94.2	5.8	0.074	

### Sieve Analysis Data for Sample E33-339-261.0



Comments: Sandy Gravel

All data are accurately and completely recorded.

Checked By: Delegation Date: 10/16/01

### Appendix C

**Borehole Geophysical Logs** 

### **Appendix C**

### **Borehole Geophysical Logs**

This appendix contains the borehole geophysical logs obtained from boreholes 222-E33-337, 299-E33-338, and 299-E33-339. The logs were run and analyzed by MACTEC-ERS. Log header information and log analyses are included with the logs.



### 299-E33-337 (C3390)

### Log Data Report

### **Borehole Information:**

Borehole: 299-E33-337 (C3390)			Site:	B Farm Perimeter	
Coord	inates	GWL (ft) ':	~260	GWL Date:	7/18/01
North	East	Drill Date	TOC' Elevation	Total Depth (ft)	Туре
N/A <sup>3</sup>	N/A	7/16/01	Not available	286	Air Rotary

### Casing Information:

Casing Type	Stickup (ft)	Outside Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel-threaded drill pipe	~ 1 in	10.75	9.375	11/16	0	281

#### **Borehole Notes:**

This is a RCRA groundwater well that was logged through the drill pipe. There is a void space around the first 16 in. of the casing.

### **Logging Equipment Information:**

Logging System:	Gamma 1D	Type: SGLS (35%)
Calibration Date:	Calibration Reference:	
	Logging Procedure:	MAC-HGLP 1.6.5

Logging System:	RLS 1		Type: Moisture
Calibration Date:	7/11/01	Calibration Reference:	RLSM00.0
		Logging Procedure:	

### Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	Repeat
Date	7/18/01	7/18/01	7/19/01	7/10/01	7/10/01
Logging Engineer	Musial/Spatz	Musial/Spatz	Pearson	Spatz	Spatz
Start Depth (ft)	1	95	144	231	271
Finish Depth (ft)	96	145	232	283	241
Count Time (sec)	200	200	200	200	200
Live/Real	L	L	L	L	L
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	n/a	n/a	n/a	n/a	n/a
Pre-Verification	A0001CAB	A0001CAB	A0002CAB	A0002CAB	A0002CAB
Start File	A0001000	A0001096	A0002000	A0002089	A0002142
Finish File	A0001095	A0001146	A0002088	A0002141	A0002172
Post-Verification	A0001CAA	A0001CAA	A0002CAA	A0002CAA	A0002CAA

#### **Neutron Moisture Logging System (NMLS) Log Run Information:**

Log Run	1	2	3	Repeat
Date	7/24/01	7/24/01	7/24/01	7/24/01
Logging Engineer	Spatz/Musial	Musial/Spatz	Musial/Spatz	Spatz
Start Depth (ft)	1	124	248.0	260
Finish Depth (ft)	125	249	260.25	229.75
Count Time (s)	n/a	n/a	n/a	n/a
Live/Real	n/a	n/a	n/a	n/a
Shield (Y/N)	N	N	N	N
MSA Interval (ft)	0.25	0.25	0.25	0.25
ft/min	1.0	1.0	1.0	1.0
Pre-Verification	C0072CAB	C0072CAB	C0072CAB	C0072CAB
Start File	C0072000	C0072497	C0082000	C0082055
Finish File	C0072496	C0072997	C0082054	C0082176
Post-Verification	C0082CAA	C0082CAA	C0082CAA	C0082CAA

### **Logging Operation Notes:**

A longer count time (200 sec) was required with the SGLS because of the relatively thick casing. In order to obtain reliable spectra while minimizing overall logging time, the depth interval was increased from 0.5 ft to 1.0 ft.

SGLS log depths are relative to ground level. Two logging runs occurred on both 7/18/01 and 7/19/01 because the liquid nitrogen needed to be recharged. Start of log spectra is at 1 ft below ground surface. Depth to water is about 261 ft. No fine gain adjustments were made during this log run (7/19/01). The hole is open at the end of the drill pipe at 281 ft.

Neutron moisture logs were run on 7/24/01 using the RLS 1, and log depths are relative to ground level. The neutron moisture tool was run centralized.

#### Analysis Notes:

	Analyst: Sobczyk	Date:	07/27/01	Reference:	
--	------------------	-------	----------	------------	--

Pre-run and post run verification spectra for the SGLS were evaluated, and the tool was found to be functioning normally. Individual spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL. Corrections were applied for a casing thickness of 11/16 in. from the ground surface to 281 ft. No casing correction was applied at 282 and 283 ft. A correction for water in the borehole was applied at and below 261 ft. Dead time corrections were not necessary.

Moisture calibration models at Hanford for 10-in. holes with ¾-in. casing have not been established. Thus, the neutron log was not processed to estimate volumetric moisture content because the relatively large borehole diameter and casing thickness are beyond the range of conditions for which the tool was calibrated. Neutron data are presented as gross counts. In general, an increase in neutron count is indicative of an increase in moisture content, but a quantitative calculation of volumetric moisture cannot be made at this time.

#### Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (<sup>40</sup>K, <sup>232</sup>Th, <sup>238</sup>U, and associated decay progeny), and man-made radionuclides. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable activity (MDA) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing and water corrections. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. A neutron moisture log of neutron counts is also shown on the combination plot.

### **Results and Interpretations:**

<sup>137</sup>Cs was the only man-made radionuclide that was detected. The only <sup>137</sup>Cs concentration occurs at 1 and 2 ft below ground surface. The measured <sup>137</sup>Cs concentration is about 0.4 pCi/g.

The changes in gross gamma counts depend primarily upon changes in <sup>40</sup>K concentrations. The increase in gross gamma counts from about 83 cps to about 100 cps at a log depth of 54 ft corresponds with an increase in apparent <sup>40</sup>K concentrations from about 11 pCi/g to 14 pCi/g. Similarly, the decrease in gross gamma counts from 90 cps to 80 cps at a log depth of 218 ft corresponds to a decrease in <sup>40</sup>K concentrations from about 13 pCi/g to 11 pCi/g. The abrupt decrease in total gamma counts at a log depth of 261 ft is due to the increased shielding of the detector by groundwater in the borehole. The apparent increase in gross gamma counts at the bottom of the hole (282 ft and 283 ft) occurs because the detector is not being shielded by the drill pipe.

The neutron moisture log showed relatively little response. This lack of response is due at least in part to the low-activity source, short source-to-detector spacing, and large borehole diameter. The slightly elevated neutron cps that occurs between about 19 and 30 ft corresponds with an interval of relatively high total gamma. This zone is interpreted as a layer of finer grained sediments surrounded by coarser sediments. The highest neutron counts occurred in the 121- to 125-ft interval. This interval corresponds with a slight drop in total gamma and <sup>40</sup>K activity. An overlap between logging runs one and two occurred between 124 and 125 ft. There was good agreement between the two runs in this overlap.

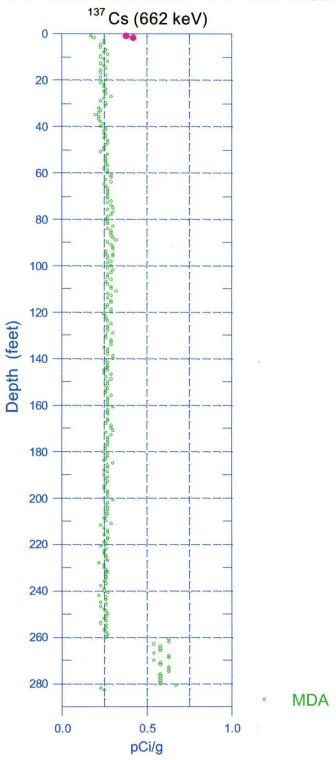
C.4

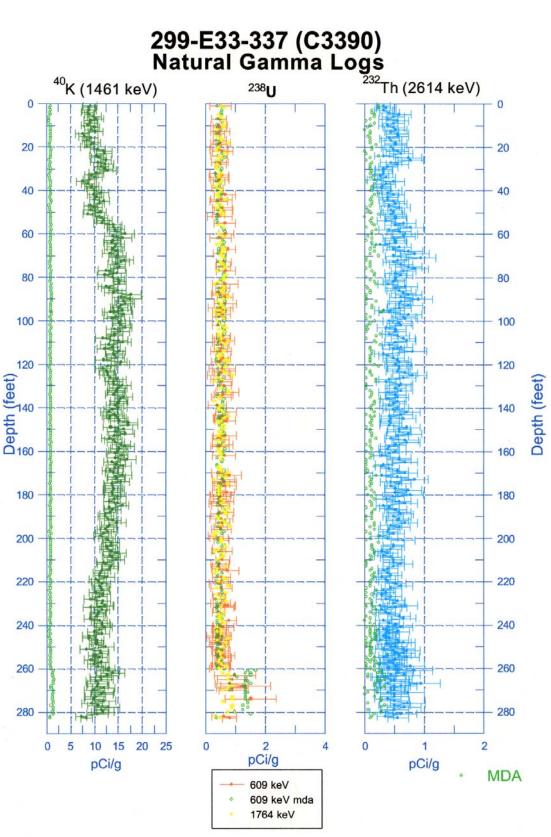
<sup>&</sup>lt;sup>1</sup> GWL – groundwater level

<sup>&</sup>lt;sup>2</sup> TOC – top of casing

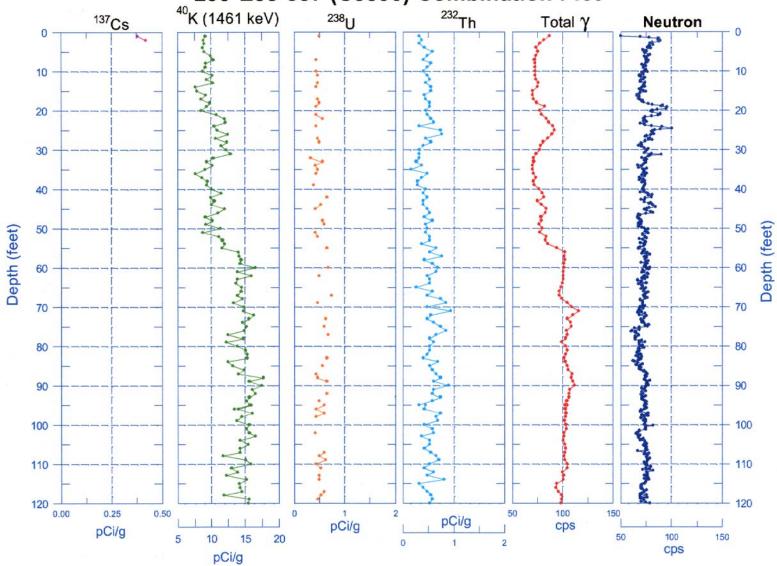
<sup>&</sup>lt;sup>3</sup> N/A – not applicable

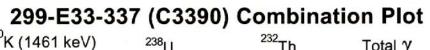
### 299-E33-337 (C3390) Man-Made Radionuclide Concentrations

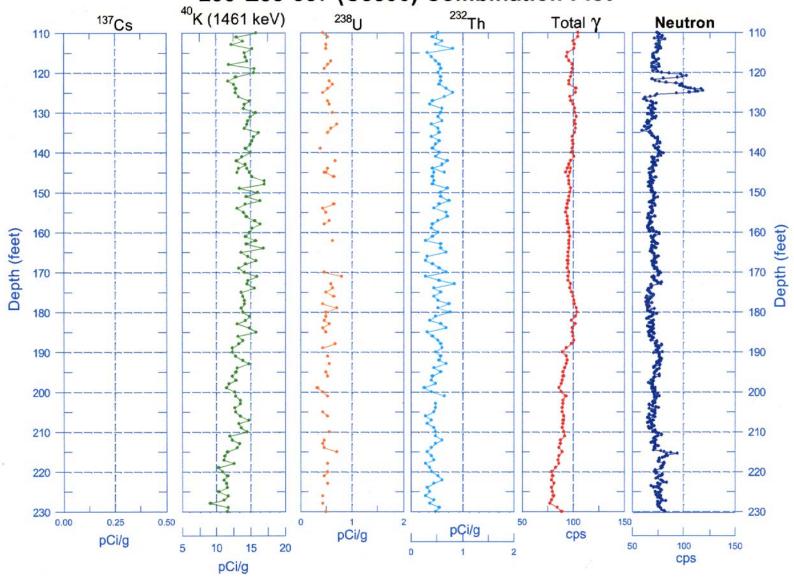




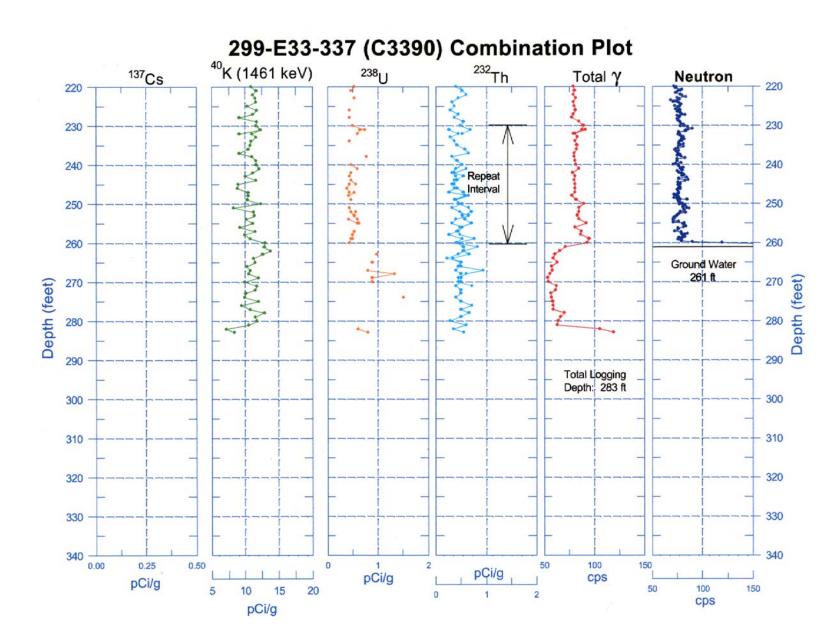




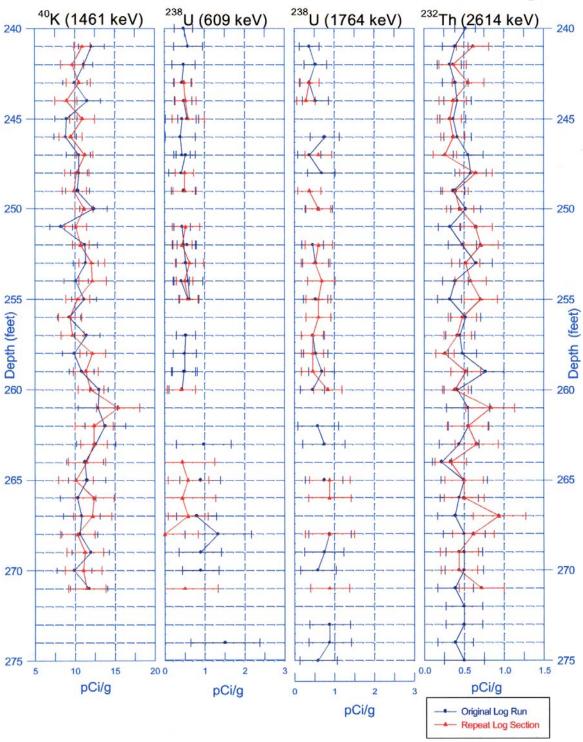




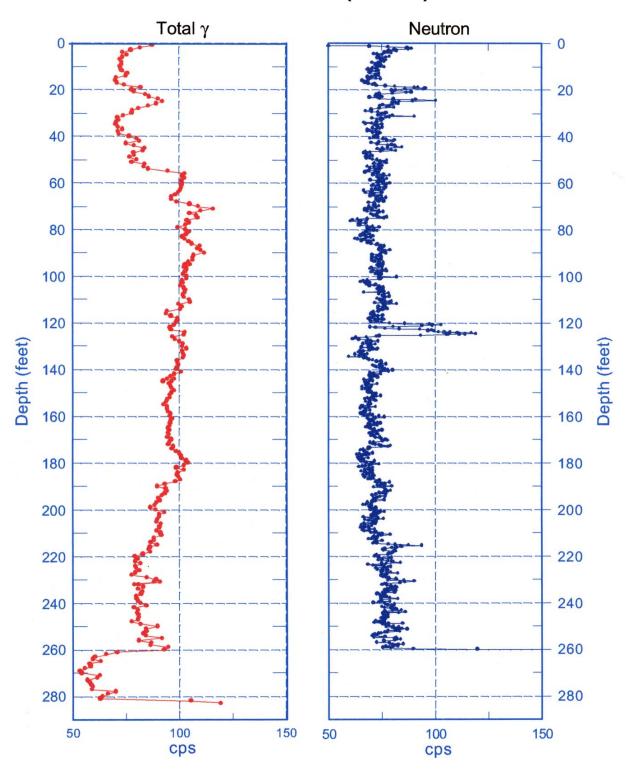
C.8



299-E33-337 (C3390)
Rerun Section of Man-Made and Natural Gamma Logs



### 299-E33-337 (C3390)





### 299-E33-338 (C3391)

### Log Data Report

#### **Borehole Information:**

Borehole:	299-E33-338 (C	3391)	Site:	B Farm Monitoring	Well
Coordina	tes (Plant)	GWL (ft) 1:	250.0	GWL Date:	08/13/01
North	East	Drill Date	TOC <sup>*</sup> Elevation	Total Depth (ft)	Туре
N/A <sup>3</sup>	N/A	08/01	N/A	275.0	cable tool

### **Casing Information:**

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel (threaded)	0.25	11.875	10.375	0.75	0	50.0
Steel (threaded)	2.13	10.6875	9.8125	0.4375	0	271.0

### **Borehole Notes:**

The borehole information provided above is derived from personal communication with T. Hottle, Bechtel Hanford Incorporated site representative. The casing information is derived from caliper measurements collected in the field by MACTEC-ERS personnel. Logging measurements are referenced to ground surface.

### **Logging Equipment Information:**

Logging System:	Gamma 2B		Type: SGLS (35%)
Calibration Date:	09/00	Calibration Reference:	GJO-2001-245-TAR
		Logging Procedure:	MAC-HGLP 1.6.5

Logging System:	Gamma 2E		Type: NMLS
Calibration Date:	05/01	Calibration Reference:	GJO-2001-247-TAR
		Logging Procedure:	MAC-HGLP 1.6.5

#### **Spectral Gamma Logging System (SGLS) Log Run Information:**

Log Run	1	2	3 (Repeat)	4	5 (Repeat)
Date	08/13/01	08/13/01	08/13/01	08/14/01	08/14/01
Logging Engineer	Musial	Musial	Musial	Musial	Musial
Start Depth (ft)	0.0	125.0	207.0	206.0	225.0
Finish Depth (ft)	126.0	207.0	186.0	275.0	218.0
Count Time (sec)	200	200	200	200	200
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0
ft/min	n/a*	n/a	n/a	n/a	n/a
Pre-Verification	B0034CAB	B0034CAB	B0034CAB	B0035CAB	B0035CAB
Start File	B0034000	B0034127	B0034210	B0035000	B0035070
Finish File	B0034126	B0034209	B0034231	B0035069	B0035077
Post-Verification	B0034CAA	B0034CAA	B0034CAA	B0035CAA	B0035CAA

#### Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2 (Repeat)	
Date	08/14/01	08/14/01	
Logging Engineer	Musial	Musial	
Start Depth (ft)	48.0	60.0	
Finish Depth (ft)	256.0	81.0	
Count Time (sec)	n/a	n/a	
Live/Real	n/a	n/a	
Shield (Y/N)	N	N	
MSA Interval (ft)	0.25	0.25	
ft/min	1.0	1.0	
Pre-Verification	C0011CAB	C0011CAB	
Start File	C0011000	C0011832	
Finish File	C0011831	C0011916	
Post-Verification	C0011CAA	C0011CAA	

#### **Logging Operation Notes:**

SGLS and NMLS logging were performed over two separate days. The SGLS logging occurred inside double casing between 0 and 50 ft and through single casing from 50 to 271 ft; the bottom 4 ft of the borehole did not have casing. A longer count time (200 sec) was required with the SGLS because of the relatively thick casing. To obtain reliable spectra while minimizing overall logging time, the depth interval was increased from 0.5 to 1.0 ft. Repeat sections for the SGLS logging were collected from 186 to 207 ft and from 218 to 225 ft.

The NMLS logging occurred from 48 to 256 ft in depth through a single casing except between 48 and 50 ft. The neutron moisture tool was run centralized. A single NMLS logging repeat section was collected between 60 and 81 ft.

#### **Analysis Notes:**

Analyst:	Henwood	Date:	08/28/01	Reference:	MAC-VZCP 1.7.9 Rev. 2
/ miaiyot.	1 101111000	~ · · ·	OO # O O	100001011001	101/10 TEO!   1.1.0 110 T. E

Pre-run and post-run verification of the logging tool were performed for each day's log event. The post-run verification for log runs 4 and 5 failed the acceptance criteria. The peak counts per second for the 609- and 1461-keV energy peaks were below the lower control limit. Examination of spectra indicates the detector appears to be functioning normally and the log data are provisionally accepted. The pre-verification spectra collected during log runs 4 and 5 and the post-verification for log runs 1, 2, and 3 were used for the energy and resolution calibration for the data processing.

Each SGLS spectrum collected during a log run was processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL using an efficiency function and corrections for casing and water as appropriate. No dead time corrections were necessary in this borehole as it ranged below 10 percent.

Verification measurements were also collected for the NMLS. Acceptance criteria have not yet been established for the newly deployed logging system. However, the pre- and post-run total count measurements agree within about 5 percent, suggesting the logging system was operating properly.

Moisture calibration models at Hanford for the borehole diameter and casing used in this borehole have not been established. Thus, the neutron log was not processed to estimate volumetric moisture content because the relatively large borehole diameter and casing thickness are beyond the range of conditions for which the tool was calibrated. Borehole diameter is a major factor in neutron response. Neutron data are presented as

gross counts. In general, an increase in neutron count is indicative of an increase in moisture content, but a quantitative calculation of volumetric moisture cannot be made at this time.

The <sup>214</sup>Bi peak at 1764 keV was used to determine the naturally occurring <sup>238</sup>U concentrations rather than the <sup>214</sup>Bi peak at 609 keV. The lower energy 609-keV peak could not be distinguished in many of the spectra within the double-cased interval from 0 to 50 ft.

Repeat log plots at selected depth intervals for KUT concentrations and neutron count rate measurements were evaluated. The plots indicate good agreement between successive log runs, demonstrating repeatability in both depth and concentration measurement.

#### Log Plot Notes:

Separate log plots are provided for the man-made radionuclide (<sup>137</sup>Cs), naturally occurring radionuclides (<sup>40</sup>K, <sup>238</sup>U [KUT]), a combination of man-made, KUT, total gamma and neutron, total gamma plotted with dead time, and repeat section plots for KUT and neutron. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable limit (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. These errors are discussed in the calibration report.

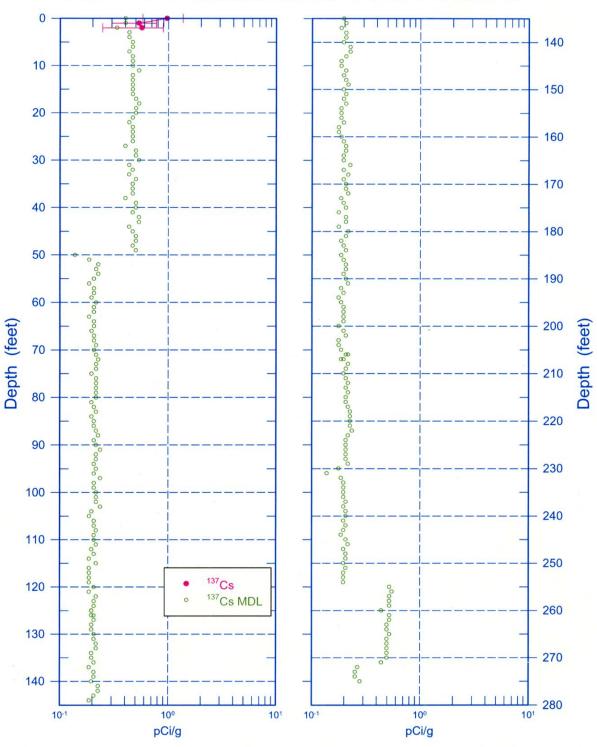
#### Results and Interpretations:

The only man-made radionuclide detected in this borehole was <sup>137</sup>Cs. This radionuclide was measured near the ground surface at less than 1 pCi/g.

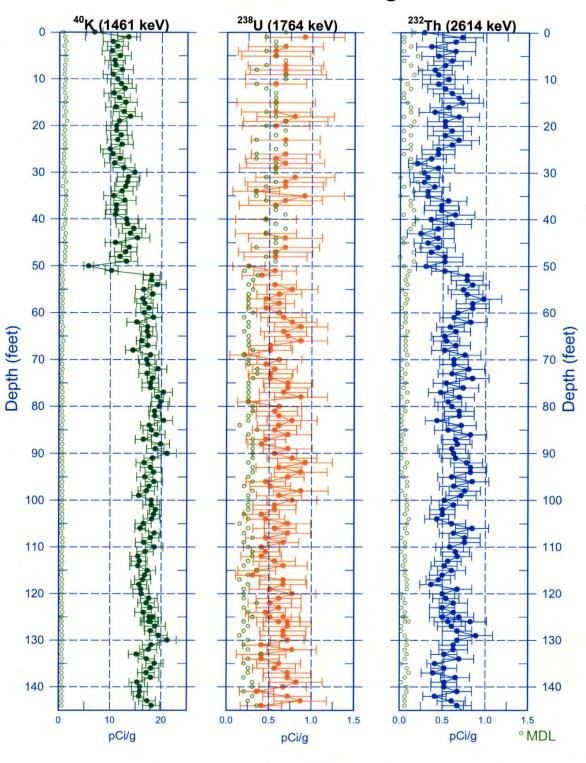
The KUT logs do not have sufficient character in most of the borehole to delineate any definitive lithologic units. Changes in the KUT and total gamma at about 50 ft are the result of a change in the casing configuration. The casing corrections for the interval from 0 to 50 ft are based on a combined thickness for two casings of about 1.25 in. The uncertainty of the casing correction for this thickness is significant and it appears the concentrations have been slightly underestimated in this depth interval.

Notable intervals of apparent higher moisture content exist at about 105, 172, and 222 ft. It appears these intervals are associated with finer grained material on the basis of slightly elevated concentrations of <sup>232</sup>Th. At the time of neutron logging, groundwater was encountered at about 255 ft.

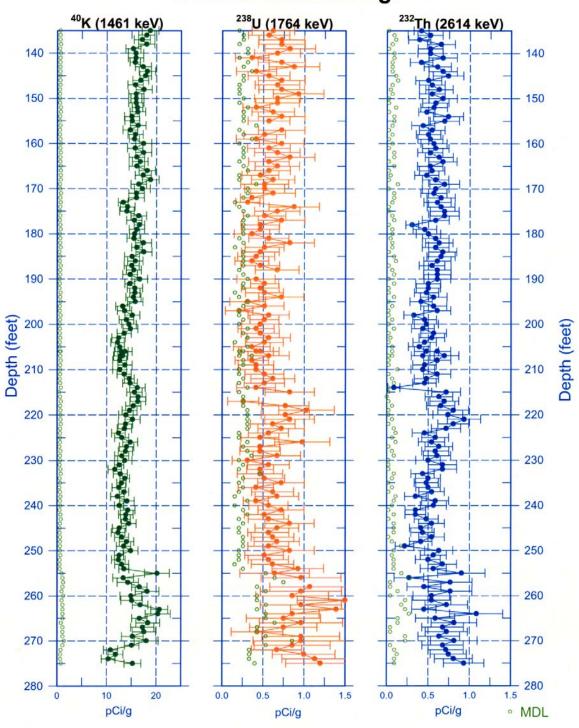
299-E33-338 (C-3391) Man-Made Radionuclide Concentrations



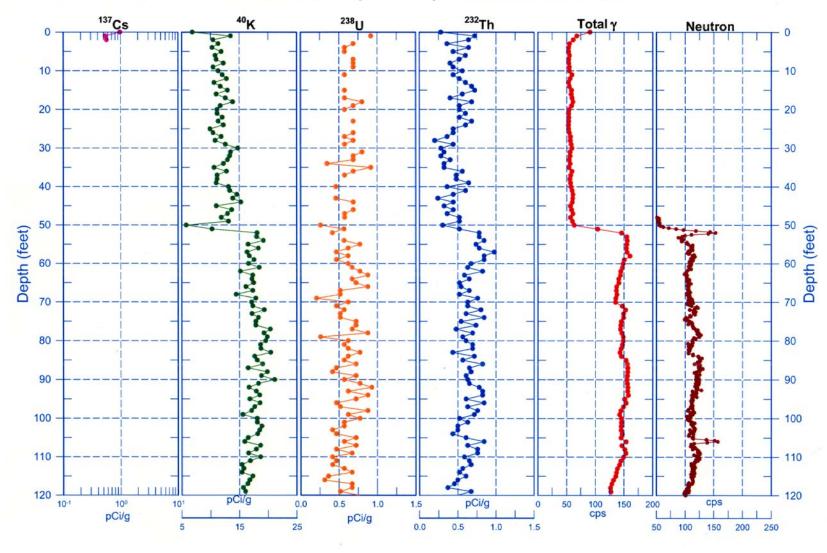
### 299-E33-338 (C-3391) Natural Gamma Logs



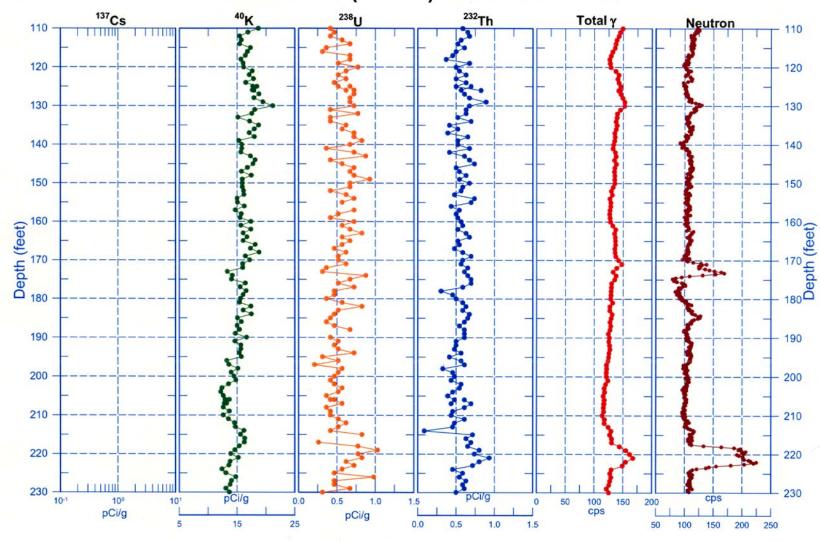
### 299-E33-338 (C-3391) Natural Gamma Logs



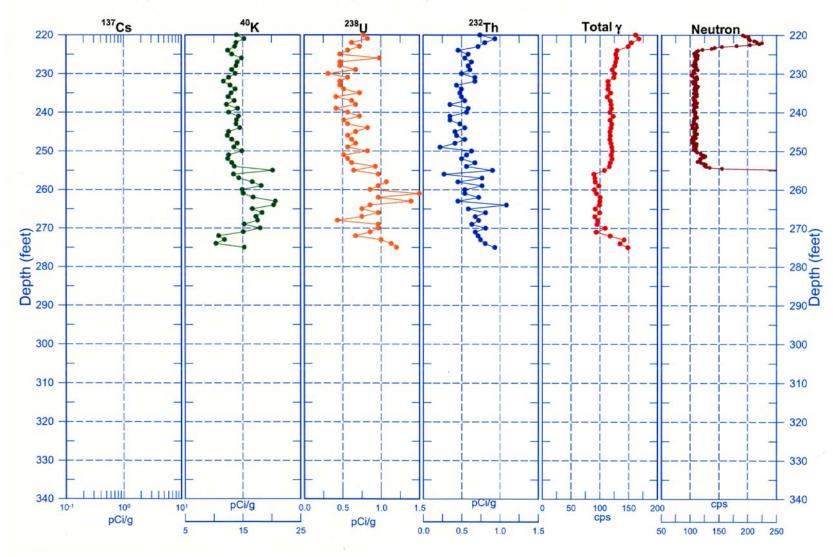
### 299-E33-338 (C-3391) Combination Plot



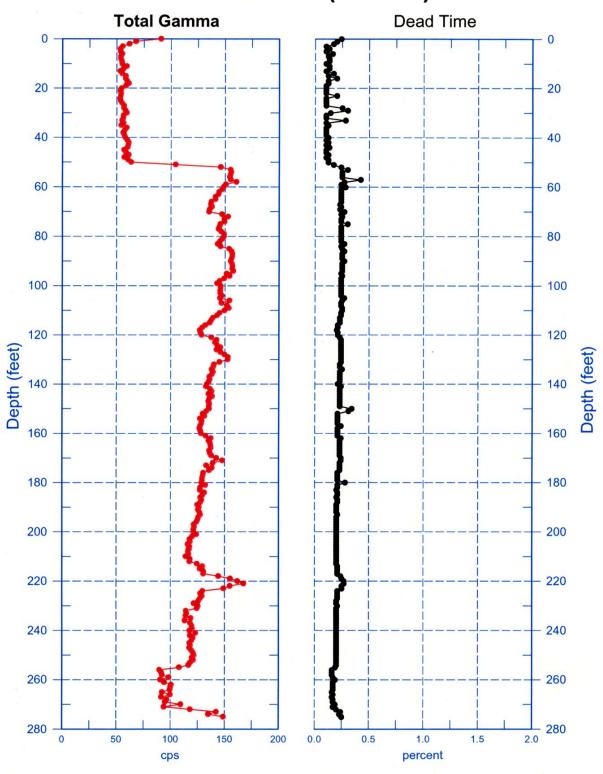
### 299-E33-338 (C-3391) Combination Plot



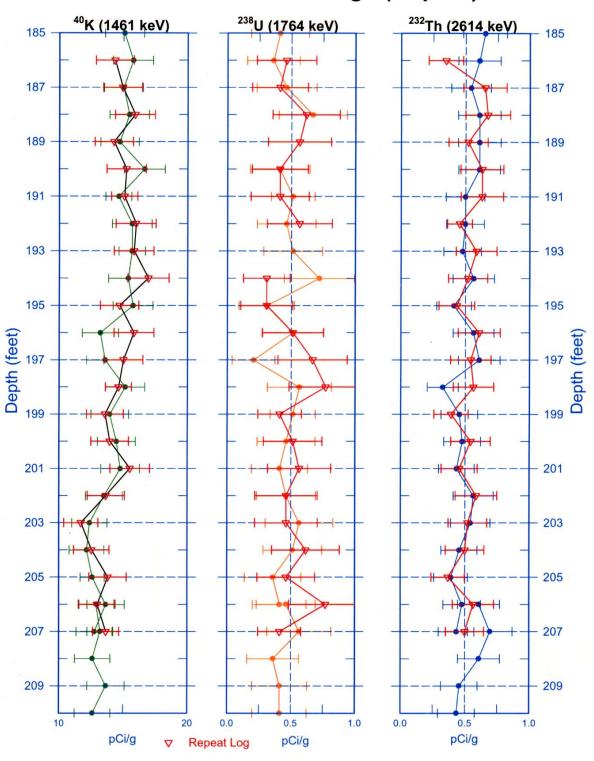
### 299-E33-338 (C-3391) Combination Plot



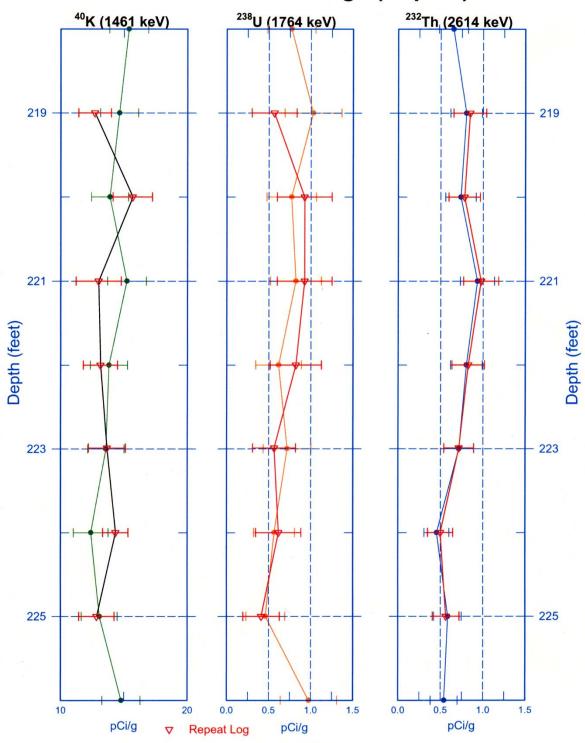
## 299-E33-338 (C-3391)



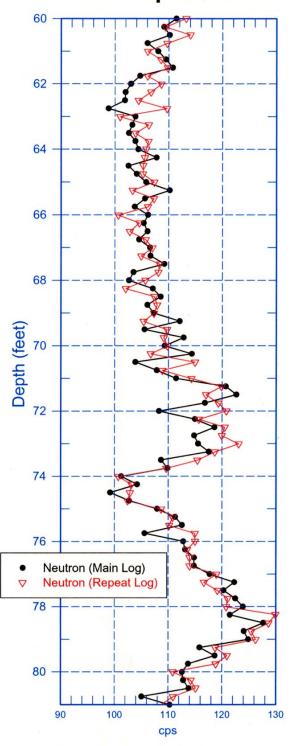
### 299-E33-338 (C-3391) Natural Gamma Logs (Repeat)



299-E33-338 (C-3391) Natural Gamma Logs (Repeat)



### 299-E33-338 (C-3391) Neutron Repeat Section





### 299-E33-339 (C3392)

### Log Data Report

### **Borehole Information:**

Borehole:	299-E33-337 (C	C3392)	Site:	BX Farm Perimete	
Coordi	nates	GWL (ft) 1:	~260	GWL Date:	7/26/01
North N/A <sup>3</sup>	East N/A	<b>Drill Date</b> 7/19/01	TOC <sup>2</sup> Elevation Not available	Total Depth (ft) 280.69	Type

### **Casing Information:**

Casing Type	Stickup (ft)	Outer Diameter (In.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel-threaded drill pipe	~ 1 in		9 1/4	3/4	0	~281

### **Borehole Notes:**

This is a RCRA groundwater well that was logged through the drill pipe.

### **Logging Equipment Information:**

Logging System:	Gamma 2B		Type:	SGLS (35%)	
Calibration Date:		Calibration Reference:			
		Logging Procedure:	MAC-HGL	P 1.6.5	

Logging System:	RLS 1		Type:	Moisture
Calibration Date:	7/11/01	Calibration Reference:	RLSM00.0	)
		Logging Procedure:		

### Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4/Repeat
Date	7/27/01	7/30/01	7/31/01	8/01/01
Logging Engineer	Musial	Musial	Musial	Musial
Start Depth (ft)	0	54	163	285
Finish Depth (ft)	55	164	262	233
Count Time (sec)	200	200	200	200
Live/Real	L	L	L	L
Shield (Y/N)	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0
ft/min	n/a	n/a	n/a	n/a
Pre-Verification	B00025CAB	B00026CAB	B00027CAB	B00028CAB
Start File	B0025000	B0026000	B0027000	B0028000
Finish File	B0025055	B0026110	B0027099	B0028052
Post Verification	B00025CAA	B00026CAA	B00027CAA	B00028CAA

#### Neutron Moisture Logging System (NMLS) Log Run Information:

Log Run	1	2	3	
Date	7/26/01	7/26/01	7/26/01	
Logging Engineer	Musial/Kos	Musial	Musial	
Start Depth (ft)	0	120	240	
Finish Depth (ft)	120	240	263.25	
Count Time (sec)	n/a	n/a	n/a	
Live/Real	n/a	n/a	n/a	
Shield (Y/N)	N	N	N	
MSA Interval (ft)	0.25	0.25	0.25	
ft/min	1.0	1.0	1.0	
Pre-Verification	C0092CAB	C0092CAB	C0092CAB	
Start File	C009000	C009481	C0010000	
Finish File	C009480	C009961	C0010096	
Post Verification	C0102CAA	C0102CAA	C0102CAA	

#### **Logging Operation Notes:**

A longer count time (200 sec) was required with the SGLS because of the relatively thick casing. The borehole was logged in the drill pipe before completion as a groundwater monitoring well. In order to obtain reliable spectra while minimizing overall logging time, the depth interval was increased from 0.5 ft to 1.0 ft.

SGLS log depths are relative to ground level. During logging run 2, a fine gain adjustment occurred at file B0026089 (143 ft) from 2123 to 2126 channels. The hole is open at the end of the drill pipe at 281 ft.

Neutron moisture logs were run on 7/26/01 using the RLS 1, and log depths are relative to ground level. The neutron moisture tool was run centralized. The end of the sonde had about 6 in. of muck on it when brought to surface.

### **Analysis Notes:**

Analyst:   Sobczyk   Date:   08/07/01   Reference:
----------------------------------------------------

Pre-run and post run verification spectra for the SGLS were evaluated. All of the pre-survey verification spectra were within the control limits. The post-survey verification spectrum for logging run 1 (file B00025CAA) was the only post-survey verification spectrum that was outside of the control limits. The peak cps for the 609-keV peak was below the lower control limits for this post run verification spectra. Examinations of spectra indicate that the detector appears to have functioned normally during the log run. Individual spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL. Corrections were applied for a casing thickness of 3/4 in. from the ground surface to 281 ft. No casing correction was applied at 282 to 285 ft. A correction for water in the borehole was applied at and below 262 ft. Dead time corrections were not necessary.

Moisture calibration models at Hanford for 10-in. boreholes with ¾-in. casing have not been established. Thus, the neutron log was not processed to estimate volumetric moisture content because the relatively large borehole diameter and casing thickness are beyond the range of conditions for which the tool was calibrated. Neutron data are presented as gross counts. In general, an increase in neutron count is indicative of an increase in moisture content, but a quantitative calculation of volumetric moisture cannot be made at this time.

There is an apparent cyclic nature to this neutron log, which may be due to the manner in which the borehole was drilled. The period of the cycle appears to be about 12 ft. Water added to the hole during drilling and the use of joint compound at easing connections are potential causes.

#### Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (<sup>40</sup>K, <sup>232</sup>Th, <sup>238</sup>U, and associated decay progeny), and man-made radionuclides. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable activity (MDA) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and does not include errors associated with the inverse efficiency function, dead time correction, or casing and water corrections. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. A neutron moisture log of neutron counts is also shown on the combination plot.

#### **Results and Interpretations:**

 $^{137}$ Cs was the only man-made radionuclide that was detected.  $^{137}$ Cs activity was observed at only one measurement, which was at the ground surface. The measured  $^{137}$ Cs activity is about 0.7 pCi/g.

The changes in gross gamma counts depend primarily upon changes in <sup>40</sup>K activities. The increase in gross gamma counts from about 85 cps to about 117 cps at a log depth of 54 ft corresponds with an increase in apparent <sup>40</sup>K activity from about 14 pCi/g to 22 pCi/g. Similarly, the increase in gross gamma counts from 106 cps to 130 cps at a log depth of 170 ft corresponds to an increase in <sup>40</sup>K activity from about 22 pCi/g to 24 pCi/g as well as an increase in <sup>232</sup>Th activity from about 0.8 to 1.4 pCi/g. The increase in gross gamma counts from 90 cps to 150 cps at 244 ft corresponds to an increase in <sup>40</sup>K activity from about 16 pCi/g to 22 pCi/g, in <sup>232</sup>Th activity from about 0.8 to 1.4 pCi/g, and in <sup>238</sup>U activity from about 0.9 to 1.5 pCi/g. These apparent increases in total activity are due to relative decreases in sediment grain size. The apparent decreases in sediment grain size at about 170 ft and at 244 ft correspond with expected increases in neutron cps while the change at 54 ft does not have a corresponding increase in neutron cps. Generally, an increase in neutron counts is expected to occur where an increase gamma ray counts occurs. At a log depth of 54 ft, the increase in total gamma occurs without an increase in neutron counts probably because the spectral gamma ray tool has a deeper radius of investigation than the neutron moisture tool.

The neutron moisture tool's depressed response in this hole is due to the low-activity source, short source-to-detector spacing, and large borehole diameter. The elevated neutron cps that occur at about 170 ft and 244 ft correspond with intervals of relatively high total gamma. These zones are interpreted as layers of finer grained sediments surrounded by coarser sediments. The highest neutron counts occurred in the groundwater as expected. This interval corresponds with a slight drop in total gamma and <sup>40</sup>K activity.

The apparent increase in <sup>238</sup>U concentration below the groundwater level is interpreted as an indication of dissolved radon (<sup>222</sup>Rn) in the water. Total gamma counts and count rates for the 1461 keV (<sup>40</sup>K) and 2615 keV (<sup>208</sup>Tl / <sup>232</sup>Th) gamma lines are observed to decrease below the water level because of increased attenuation as gamma rays pass through the water. Application of the water correction factor compensates for this attenuation. However, count rates for several gamma lines associated with <sup>238</sup>U were observed to increase at the groundwater level. These included the 351 keV (<sup>214</sup>Pb), 609 keV (<sup>214</sup>Bi), and 1764 keV (<sup>214</sup>Bi) lines. <sup>214</sup>Pb and <sup>214</sup>Bi are the eighth and ninth members of a complex decay chain, which begins with <sup>238</sup>U and ends with <sup>206</sup>Pb. Under normal conditions, members of the decay chain are assumed to be in secular equilibrium, meaning that activities of each member of the chain in proportion to one another. Of the gamma lines emitted by the various <sup>238</sup>U decay progeny, those associated with <sup>214</sup>Bi and <sup>214</sup>Pb are the most prominent, and are commonly used to calculate <sup>238</sup>U concentration. In water, the radioactive equilibrium is less likely to be maintained, because Bi and U have differing chemical properties. Therefore, the presence of <sup>214</sup>Bi in water is not necessarily an indication of dissolved uranium. However, <sup>214</sup>Bi and <sup>214</sup>Pb are also decay products of <sup>222</sup>Rn, the gaseous member of the decay chain. As a gas, radon is relatively mobile and soluble in water. Establishment of secular equilibrium between <sup>214</sup>P, <sup>214</sup>Bi, and <sup>222</sup>Rn

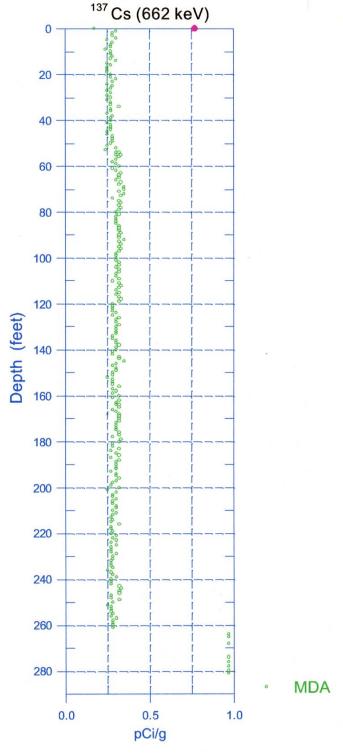
requires only a few hours, and any radon dissolved in the groundwater would also result in increased <sup>214</sup>Pb and <sup>214</sup>Bi activity.

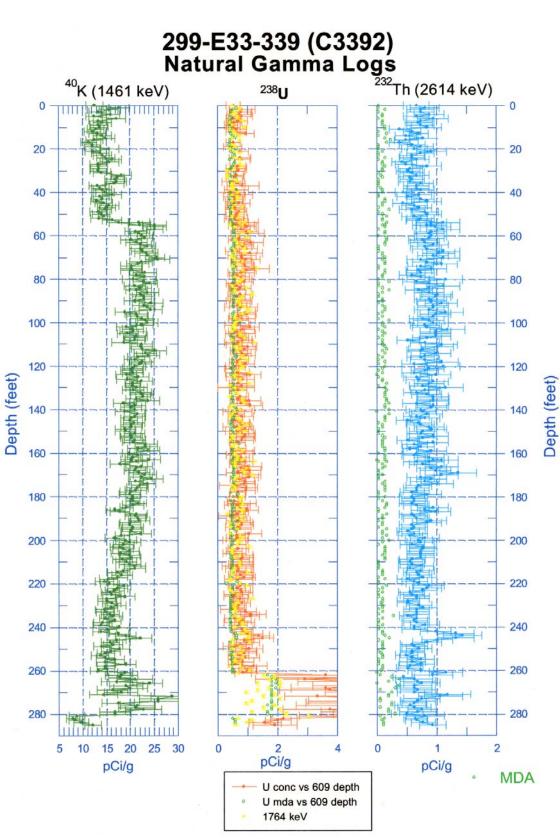
Note that the elevated <sup>214</sup>Bi levels observed in the groundwater do <u>not</u> suggest the presence of uranium contamination from a man-made source. Establishment of secular equilibrium between <sup>214</sup>Bi and <sup>238</sup>U requires a time period on the order of a million years, so the presence of <sup>214</sup>Bi is commonly taken as an indication of naturally occurring <sup>238</sup>U that has not be subjected to chemical separation. Man-made <sup>238</sup>U would be indicated by the presence of the 1001-keV gamma line associated with <sup>234m</sup>Pa, with little evidence of the 609- and 1764-keV lines associated with <sup>214</sup>Bi. The apparent increase in gross gamma counts at the bottom of the hole (282 ft through 285 ft) occurs because the detector is not being shielded by the drill pipe.

<sup>&</sup>lt;sup>1</sup> GWL – groundwater level <sup>2</sup> TOC – top of casing

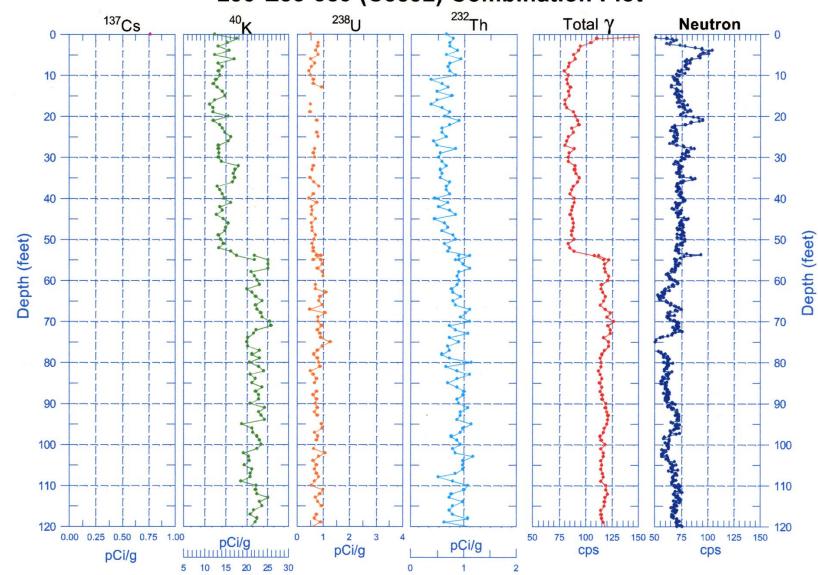
<sup>&</sup>lt;sup>3</sup> N/A – not applicable

# 299-E33-339 (C3392) Man-Made Radionuclide Concentrations

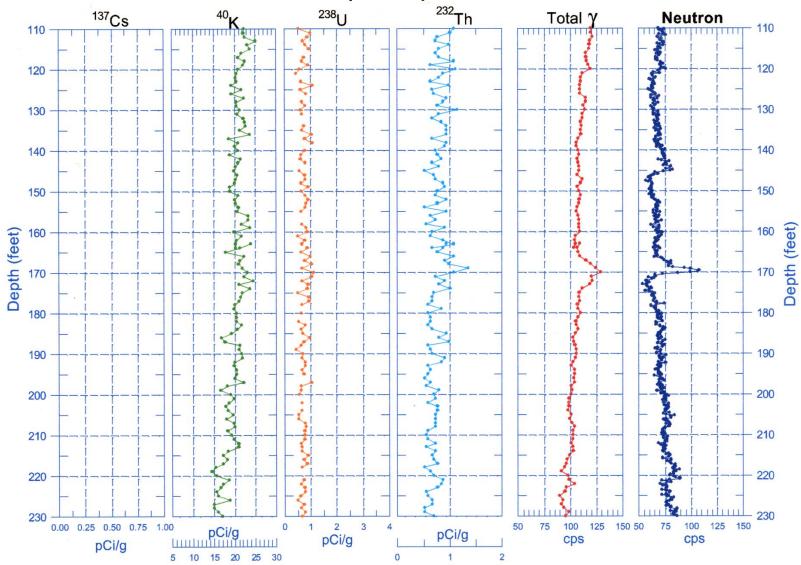




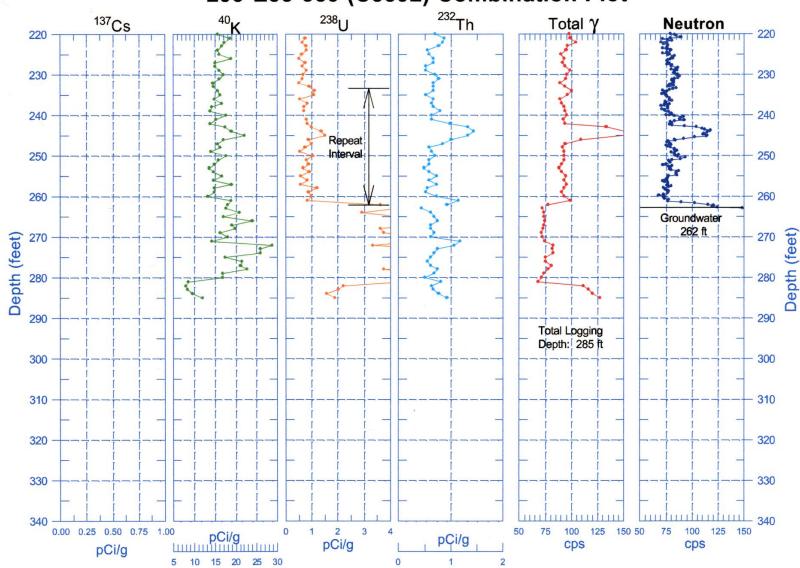
### 299-E33-339 (C3392) Combination Plot



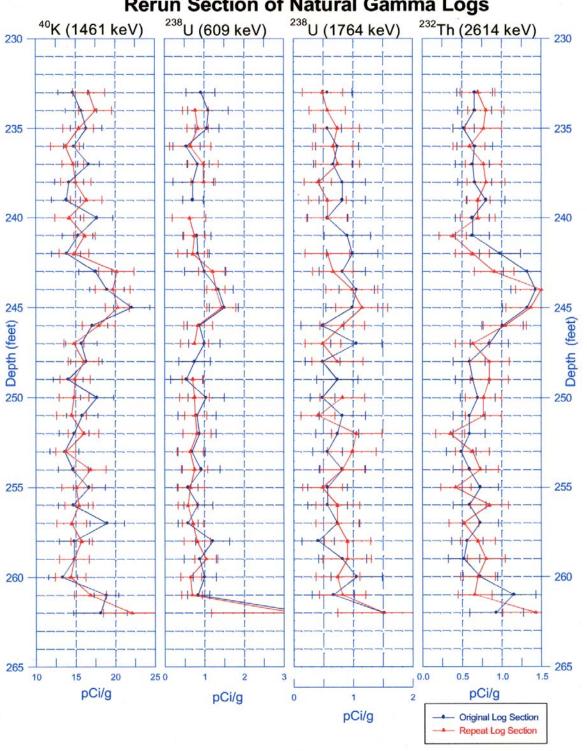
### 299-E33-339 (C3392) Combination Plot



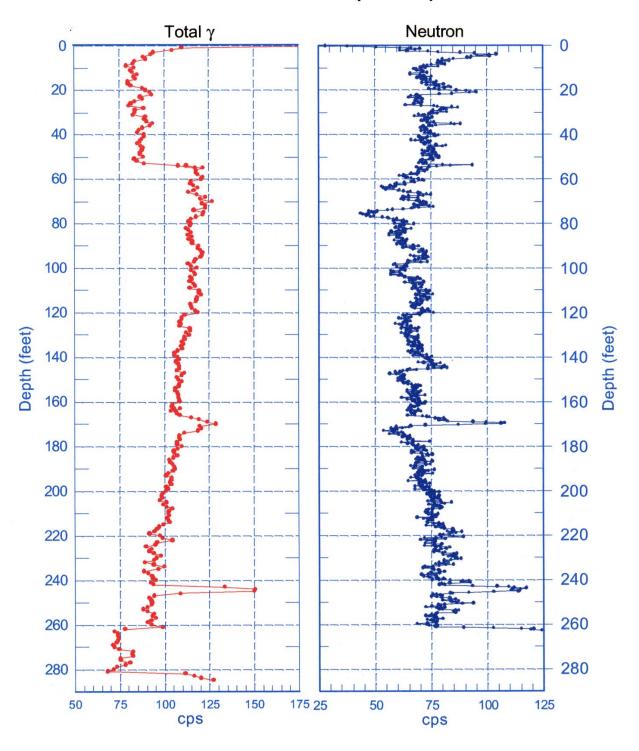
### 299-E33-339 (C3392) Combination Plot



299-E33-339 (C3392) Rerun Section of Natural Gamma Logs



### 299-E33-339 (C3392)



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